

J. H. VAN DEVENTER
President and Editor

C. S. BAUR
Vice-President and General Manager

C. E. WRIGHT J. A. ROWAN A. I. FINDLEY
Managing Editor News Editor Editor Emeritus

R. E. MILLER F. J. WINTERS T. W. LIPPERT
Machinery Editor Art Editor Metallurgical Editor

Associate Editors
F. J. OLIVER W. A. PHAIR G. RICCIARDI

Washington Editors
L. W. MOFFETT JAMES G. ELLIS

Resident District Editors
T. C. CAMPBELL ROBERT G. BINGHAM
Pittsburgh Chicago

D. R. JAMES W. F. SHERMAN
Cleveland Detroit

Editorial Correspondents
F. T. TURNER, JR. ROBERT G. MCINTOSH
Buffalo Cincinnati
G. PHAZAR P. FIDRMUC
Boston Hamburg, Germany
C. F. MEYER CHARLES POST
Milwaukee San Francisco
F. SANDERSON CLYDE W. ENNIS
Toronto, Ontario Birmingham
LEROY W. ALLISON ROY M. EDMONDS
Newark, N. J. St. Louis



A. H. DIX, *Manager Reader Service*

ADVERTISING STAFF

Emerson Findley } 621 Union Bldg., Cleveland
Robert F. Blair }
B. L. Herman, Culliton Bldg., Phila.
H. K. Hottenstein, 1012 Otis Bldg., Chicago
H. E. Leonard, 239 W. 39th St., New York
Pelree Lewis, 7310 Woodward Ave., Detroit
C. H. Ober, 239 W. 39th St., New York
W. B. Robinson } 428 Park Bldg., Pitts.
W. J. Fitzgerald }
D. C. Warren, P. O. Box 81, Hartford, Conn.
Don F. Harner, 1595 Pacific Avenue, Long
Beach, Cal.



Member, Audit Bureau of Circulations
Member, Associated Business Papers
Indexed in the Industrial Arts Index.
Published every Thursday. Subscription
Price: United States and Possessions,
Mexico, Cuba, \$6.00; Canada,
\$8.50; Foreign, \$12.00 a year.
Single copy, 25 cents. Annual Number
\$1.00. Cable Address, "Ironage,
N. Y."



Owned and Published by
CHILTON COMPANY
(Incorporated)



Publication Office **Editorial and Executive Offices**
Chestnut and 56th Sts., 239 West 39th St.,
Philadelphia, Pa., U.S.A. New York, N. Y., U.S.A.

OFFICERS AND DIRECTORS

C. A. MUSSELMAN, *President*
JOS. S. HILDRETH, *Vice-President*
GEORGE H. GRIFFITHS, *Vice-President*
EVERIT B. TERHUNE, *Vice-President*
J. H. VAN DEVENTER, *Vice-President*
C. S. BAUR, *Vice-President*
WILLIAM A. BARBER, *Treasurer*
JOHN BLAIR MOFFETT, *Secretary*
JULIAN CHASE, THOMAS L. KANE,
G. C. BUZBY, P. M. FAHRENDORF
HARRY V. DUFFY CHARLES J. HEALE

THE IRON AGE

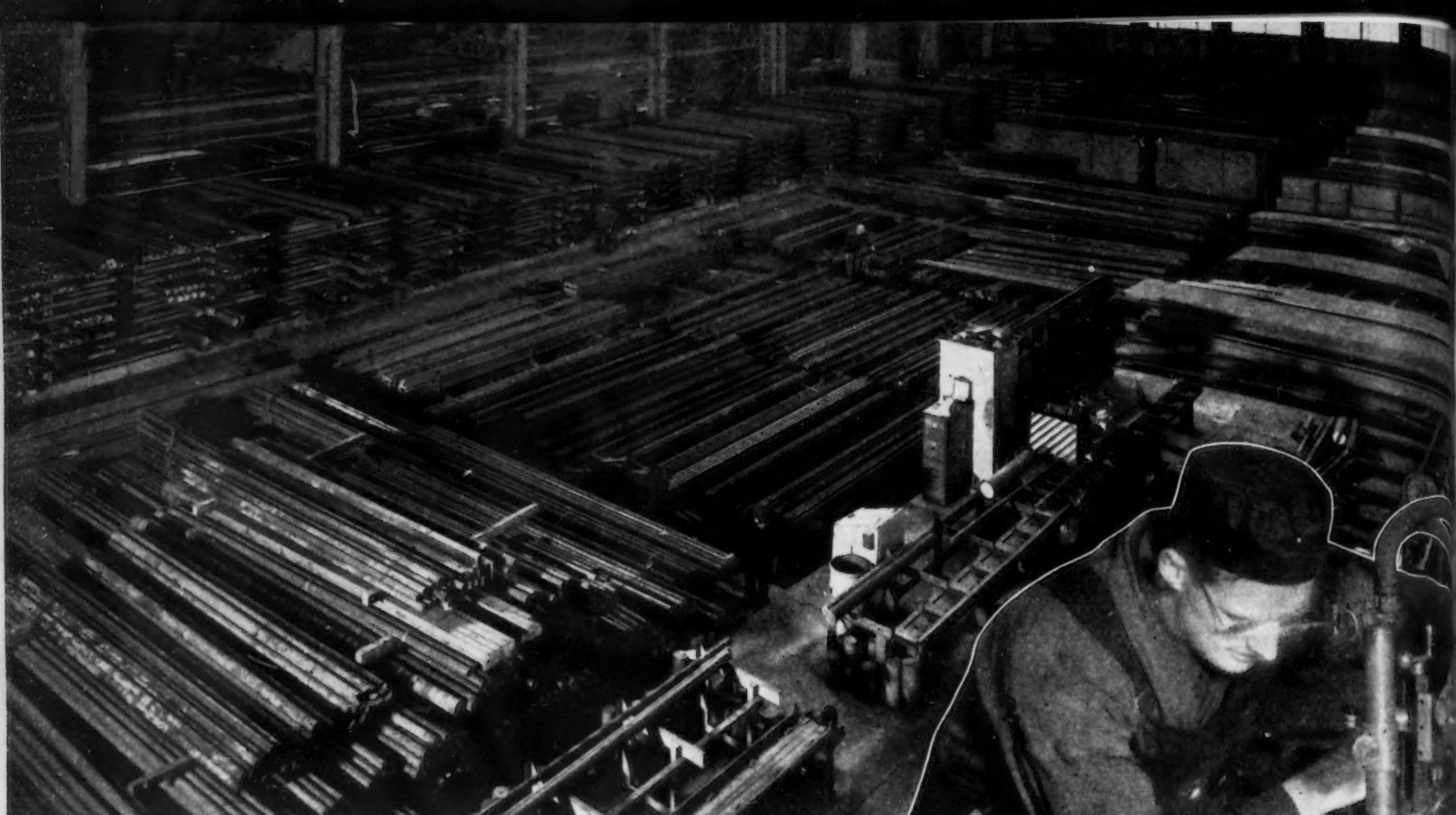
Contents

April 11, 1940

"M" Day for Industry	31
Comments on Electrolytic Polishing	33
Straight-Line Galvanizing	38
Gas Cutting of Stainless-Clad Plates	42
Continuous Casting	44
Report of American Gas Association	52
What's New in Machine Tools	54
On the Assembly Line	60
Washington News	64
THE NEWS IN BRIEF	92
Statistics on Metal Working Activity	100
Weekly Ingot Operating Rates	101
Rate of Activity in Capital Goods	101
Plant Expansion and Equipment Buying	118



Free Industrial Literature	122
Products Advertised	146
Just Between Us Two	147
Index to Advertisers	174



Tons and Tons of Steel

Every Bar Certified

10 LARGE RYERSON PLANTS carrying more than 10,000 sizes, kinds and shapes of steel products are ready to meet both your regular and emergency steel requirements—and you get Ryerson Certified quality at no extra cost. Under the Ryerson Certified Steel Plan, every pound of steel carried in stock represents the highest quality available in each particular classification. Analyses, accuracy, finish, etc., of all steels are closely controlled. A special quality control plan on the alloys gives the heat treater exact data on every bar. Testing, experimenting and retreating are eliminated and a dependable, uniform heat treatment response assured.

Ryerson offers a complete steel-service. Experienced crews working with modern facilities quickly cut and prepare the steel to meet your most exacting requirements.

There's no waiting, no delay when you order from Ryerson. Stocks are complete. Delivery is prompt. Save time, trouble and money by concentrating all your steel requirements with this one dependable source. Write for the Ryerson Stock List—the Key to Profitable Steel Buying.



Joseph T. Ryerson & Son, Inc.
Chicago, Milwaukee, St. Louis,
Cincinnati, Detroit, Cleveland,
Buffalo, Boston, Philadelphia,
Jersey City.

*Flame cutting the most intricate parts
from heavy plates is a valuable feature
of Ryerson steel-service.*

RYERSON

▲▲▲ THE IRON AGE ▲▲▲

APRIL 11, 1940

ESTABLISHED 1855

Vol. 145, No. 15

"M" Day for Industry

EVERY industrialist in this country knows about "M" Day. The plans have been carefully laid for it in elaborate detail. When and if that day is announced, American plants will immediately begin to turn out weapons of defense with which to repel the enemies of freedom.

No one questions the wisdom of preparedness. Especially preparedness for the preservation of freedom. It's a first class investment.

"M" Day looking toward prompt defense of American institutions from possible attack from abroad is a good thing. It's nice to know that we are doing something about it and so are not likely to be caught again with our pants down. But what about an "M" Day in preparation for defense of American freedom against its enemies at home?

As General Johnson has pointed out, the likelihood of a foreign power or a combination of them attacking the United States after this war is over is quite unlikely. Modern war is so destructive of values, even if it is conducted along economic rather than military lines, that winners and losers alike emerge from it weakened and not strengthened. It will take 20 years, at least, for Japan to recover from her friendly little excursion into the heart of China, if she indeed manages to find her way home again. Germany will not be in a frame of mind to undertake an overseas adventure after her citizens realize what the present one has cost them. As for Russia, her demonstration against little Finland should make us write her off our books as a first-class military power.

No, the immediate danger to American freedom is not abroad but at home. It lies in the inordinate ambitions of unelected bureaucrats, in the distorted thinking of assorted crackpots and in the insidious planning and plotting of the communistic-minded in high places. For though these vermin have disavowed the name since Hitler made Communism unfashionable in America, they are still gnawing away as industriously as ever at the framework and foundation of our freedom. You cannot change the smell of a skunk by calling him a polecat!

So we need an "M" Day for defense of freedom against its enemies at home. Not an "M" Day for the production of guns and ammunition but an "M" Day for the dissemination of information to our citizens. Information as to what constitutes freedom and what is necessary to maintain it.

That is, no doubt, why the able president of the N.A.M. last week called upon industry to mobilize in defense of the American System of Enterprise. To mobilize by marshalling the facts about industry's relation to the public welfare and to send these facts marching into every corner of America.

Mr. Prentis has pointed to the truth that religious freedom and freedom of speech are inseparably tied to freedom of enterprise. When one falls, all fall.

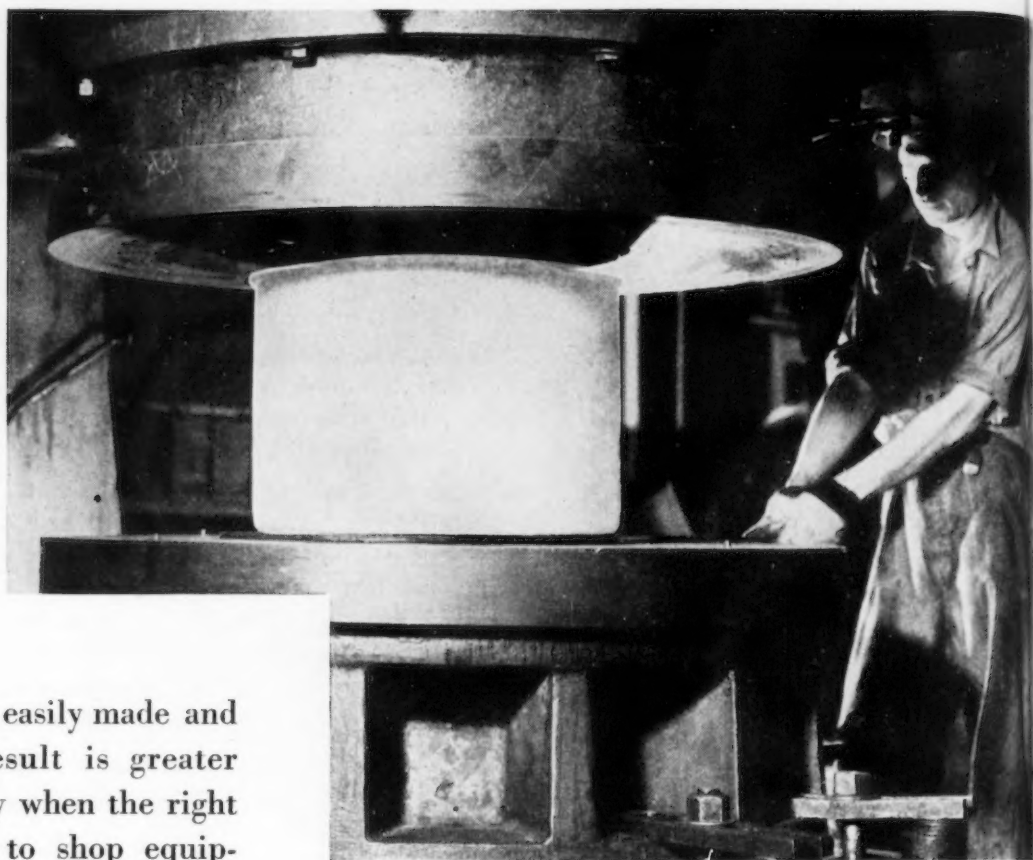
The point of attack today is freedom of enterprise. Let's rally to the call to defend it!



WHEN THE

DRAW

IS TOUGH !



WHEN "tough" draws are easily made and reject losses drop, the result is greater profit. This can happen only when the right quality of sheets is fitted to shop equipment, fabrication methods and product.

Inland experienced metallurgists are able and willing to study your problems and to recommend the steel best suited to your need—the steel that will take your "tough" draw, reduce rejects to the minimum,

make finer products and add to your profit.

At your request, an Inland metallurgist will call at your plant to discuss your problems personally—write us today!

SHEETS • STRIP • TIN PLATE • BARS • PLATES • FLOOR PLATES • STRUCTURALS • PILING • RAILS • TRACK ACCESSORIES • REINFORCING BARS

**INLAND
STEEL CO.**

**COLD ROLLED
SHEETS**

38 S. Dearborn Street, Chicago • Sales Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City, Cincinnati

Comments On Electrolytic Polishing of Metals

By H. Pray and C. L. Faust
Battelle Memorial Institute,
Columbus, Ohio

THE polishing of metals—stainless steel, copper, brass, zinc, nickel, aluminum, monel metal, etc.—electrochemically rather than mechanically is a technique which is rapidly expanding and improving. What exactly is the action of such electrochemical baths? What is the condition of the metal surface after polishing? How do the baths operate? And what may be expected commercially of such electrochemical polishing? All these inquiries are answered by the authors herein.

o o o

DURING the past few years considerable attention has been given to electrolytic polishing of metals and in the past few months publicity has been given to polishing stainless steel by electrolytic methods. Polishing methods have been under investigation at Battelle Memorial Institute for several years, and repeated requests have been made to discuss

electrolytic processes, their mechanism, scope, and usefulness. This paper does so briefly.

All electrolytic polishing processes have certain characteristics in common. They function anodically and produce "polish" or "brightness" by virtue of selective removal of metal from the surface.

Jacquet¹ described anodic polishing

of copper for metallographic purposes employing a solution of orthophosphoric acid. He concluded that while a bright surface was obtained the process did not constitute "polishing," but differentiated from nitric acid pickling because it effected uniform attack and did not yield a matte surface. Jacquet also discussed polishing of metallographic specimens of brass² and other materials.³

Earlier than these Jacquet papers, however, Fink and Kenny⁴ determined that metals are equipotentialized when subjected to an anodic treatment in certain solutions. As is shown later in this paper, equipotentializing and passivating can be effected when metals are electrolytically polished.

Lindh⁵ anodically brightened nickel or nickel coatings in a strong solution of sulphuric acid.

Schaefer⁶ discussed anodic polishing of metallographic specimens of various metals and alloys.

Blaut and Lang⁷ outlined a process of polishing stainless steel in a bath composed of sulphuric and hydrofluoric acids.

Kiefer⁸, writing on polishing of stainless steel anodically, states that the treatment produces no passivating effect and concludes that the only advantages gained in connection with corrosion result from the formation of smooth surfaces.

Lippert⁹ sketched recently the com-

¹ (a) P. A. Jacquet, "On the Anodic Behavior of Copper in Aqueous Solutions of Orthophosphoric Acid," *Transactions Electrochemical Society*, 69, 629-655 (1936); (b) P. A. Jacquet, "New Method of Preparing Perfectly Polished Metallic Surfaces," *Comptes Rendus*, 201, 1473-5 (1935); (c) P. A. Jacquet, "Mechanism of Electropolishing of Copper," *ibid*, 202, 402-4 (1936).

² P. A. Jacquet, "Micrographic Study of the Deterioration of Brass Surfaces by Mechanical Polishing," *Journal Chim. Phys.*, 33, 226-31 (1936).

³ (a) P. A. Jacquet, "Electrolytic Polishing of Copper, Lead, Tin and Their Alloys and Its Application to Metallography," *Bull. Soc. Chim.*, 3, [5], 705-13 (1936); (b) French Patent 707,526.

⁴ (a) C. G. Fink and F. J. Kenny, "The Passivity of 18-Chromium 8-Nickel Alloy,"

Transactions Electrochemical Society, 60, 235-270 (1931); (b) C. G. Fink and F. J. Kenny, "Process of Treating Metal and Alloy Articles to Improve the Resistivity Thereof to Corrosion and to the Product Thereof," U. S. Patent 1,961,752, June 5, 1934.

⁵ E. E. Lindh, "Method of Brightening Nickel Surfaces," U. S. Patent 2,145,518, Jan. 31, 1939.

⁶ C. Schaefer, "Anodic Polishing of Metals," *Metal Industry* (N. Y.), 38, [1], 22-26 (1940).

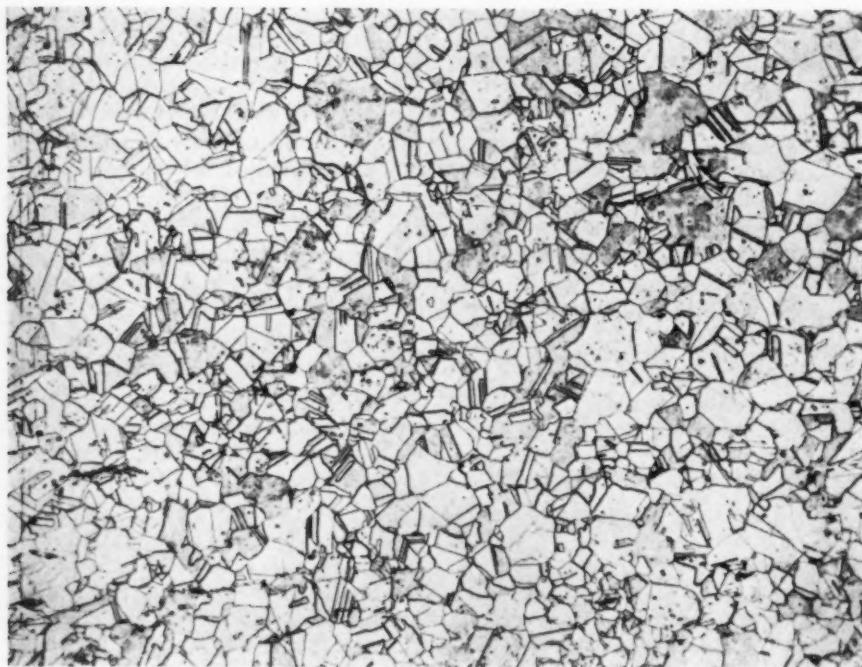
⁷ S. J. Blaut and H. M. Lang, "Electrochemical Treatment of Metals," U. S. Patent 2,115,005, April 26, 1938.

⁸ G. Kiefer, "Electrolytic Polishing of Stainless Steel," *THE IRON AGE*, 144, [25], 30-32, 66-7 (1939).

⁹ T. W. Lippert, "Pickle Polished Stainless Steel," *THE IRON AGE*, 145, [2], 22-26 (1940).



FIG. 1—Surface of 0.0005-in. nickel plate on mechanically polished (above) and electropolished (below) 18-8 stainless steel. The undistorted austenitic grains of the electropolished surface have been revealed by selective deposition of nickel whereas the continuity of structure in the nickel deposit has been destroyed by the "amorphous" layer resulting from mechanical polishing. Unetched, and at 100 diameters.



mercial status, as known to him, of electrolytic processes as applied to stainless steels, particularly stressing the operations under the process developed by Rustless Iron & Steel Corp. using a bath composed of citric and sulphuric acids.

Chemistry of Electropolishing

In its studies on metal surfaces, Battelle Memorial Institute has investigated polishing and passivating methods, including anodic treatments. Early in the studies it became apparent that development of electropolishing processes comprised more than the mere development of a bath. Polishing processes must be tailor-made; chemical, electrical, physical, mechanical and engineering features must be established not only for the different metals and alloys but also for different shapes of a given metal.

Knowledge of the mechanism of anodic dissolution of metals is necessary to understand the principles involved in anodic polishing. When metals dissolve anodically, a surface film may form and thus disturb the anodic process. If the film is non-conducting and only partly covers the anode surface, the free portion of the surface will be subjected to dissolution at greatly increased current densities if the same total current is maintained. The film and its nature depends on many factors, including the current density, electrolyte, temperature, solubility of dissolution products in the electrolyte, and polarization characteristics. It is obvious that the anode process will be governed by the electrochemical properties of the metal ions in the electrolyte used. Work done at Battelle on many different kinds of metals and baths has shown that anodic polarization of considerable magnitude invariably accompanies polishing. Electrolytic polishing results from selective removal of elevations on the metallic surface and can occur only if the rate of dissolution of elevations is greater than the depressions. This is effected when depressions are relatively anodically passive and the elevations relatively anodically active. It is unnecessary to define the exact nature of the anodic film because its function is the same whether it is an oxide, a layer of gas, a film of insoluble anodic reaction product, or a static liquid film highly concentrated in anodic products. Anodic activity, of course, is evidenced by loss of metal from the anode during electrolysis.

Metals are polished in baths that permit anodic dissolution of that metal through a highly polarizing film. It

may reasonably be expected that there will be an attack on elevations on the surface where the passivating film is thinnest with less attack in the depressions where the film is more protective. Under these conditions the anode efficiency at the elevations may be high, whereas the polarization is high and the anode efficiency low in the depressions. Any bath and operating conditions combining high anode polarization and greater anode efficiency at elevations than at depressions should effect anodic polishing of a homogeneous metal. In the case of a metal or alloy whose structure is not homogeneous, it is required further that the bath and operating conditions provide a film that will prevent selective anodic attack on the chemically different phases.

Fundamentally, a solution that will bring about these conditions is necessary. This alone, however, is not sufficient to insure commercial success. The bath must have proper throwing power to handle intricate designs and shapes without the use of too complicated and unwieldy cathodes. To compete with mechanical processes, electrochemical ones must be simple. A given bath and set of operating conditions may be effective for polishing a simple object such as wire, but the same set-up may be entirely ineffective for handling a casting or stamped object. The electrochemical behavior of the metal ions anodically formed in the electrolyte governs in a large measure the nature of the anodic passivating film; so there is no universal solution, and the electrolyte must be adapted to the anode being polished.

Electrolytical vs. Mechanical Polishing

Comprehension of the differences between mechanical and electrolytic methods of polishing is necessary to appreciate fully the nature of the product obtained electrolytically. In mechanical polishing the high spots or elevations are removed, or caused to flow, until a substantially flat surface results. The cold working operation changes the nature of the surface which is characterized by an "amorphous" or "pseudo amorphous" layer. In electropolishing, the surfaces of the grains of the metal being treated are rendered substantially level and highly lustrous without distortion and the anodic polarization equipotentializes and passivates the surface thereby increasing resistance to corrosion. The degree of passivation depends on the metal, the bath and the electropolishing conditions.

Microscopic studies illustrate the difference between the two types of

polished surfaces. For example, nickel plated on a metallographically polished specimen of stainless steel shows no structure at ordinary magnifications. This is to be expected in view of the "amorphous" layer. When nickel is plated on an electrolytically polished surface of stainless steel, it deposits in such a way as to continue the crystalline structure of the stainless steel. This is shown in accompanying photomicrographs.

Electron diffraction studies made at

shown in the photographs of mechanical and electropolished samples which were simultaneously exposed to the atmosphere of an analytical laboratory hood. The existence of an invisible passivating film on an electropolished surface is clearly demonstrated by the photomicrographs of identically etched mechanical and electropolished samples.

General Considerations

In anodic polishing processes the electrical requirements are quite simi-

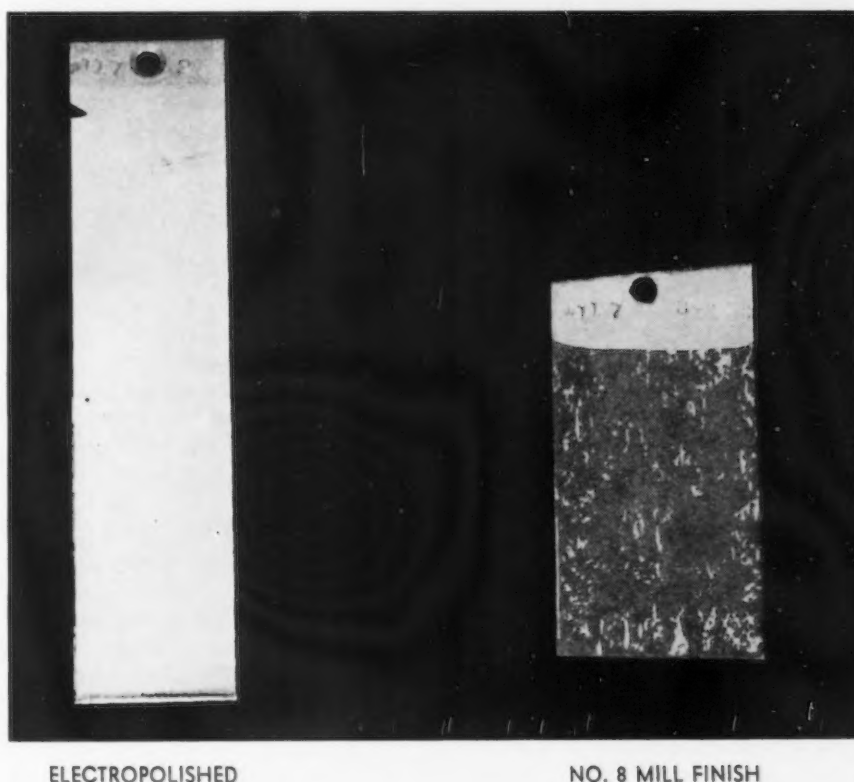


FIG. 2—Mechanical and electropolished samples of 18-8 stainless steel that were simultaneously exposed for 55 days to the atmosphere of an analytical laboratory hood. The passivating effect of the electropolishing treatment is strikingly evident. The extreme top of the electropolished sample was untreated and the top portion of both was lacquered to preserve the original finish.

Battelle on electropolished stainless steel, plain carbon steel and aluminum indicate, however, that the electron diffraction patterns were identical with those of the same surfaces polished mechanically. The probable explanation is that a thin film, probably an oxide, covers electrolytically polished surfaces and gives rise to the diffusion-ring type of pattern. These studies substantiate the conclusion that electropolished surfaces are passivated.

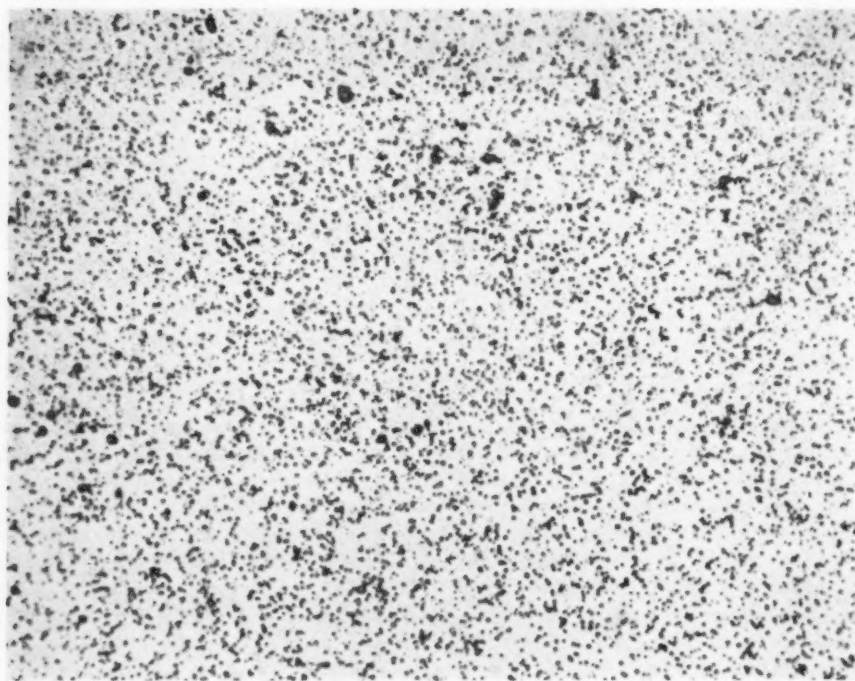
Further evidence of passivation is

lar to those in chromium plating. In fact, most chromium plating plants can operate a polishing unit with their equipment merely by reversing the direction of the direct current and providing proper solutions and containers. Lead lined tanks are suitable for most polishing baths, but use of the tank itself as cathode is not good practice.

Current density is important but in many instances not critical. Usually there is a minimum current density that must be exceeded, but the upper



FIG. 3—Mechanical (above) and electropolished (below) 18-8 stainless steel after being subjected to identical etching treatment in glycer-regia solution. The pinholes appearing on the electropolished sample demonstrate the existence of an invisible film and are the result of attack by this active etchant at weak spots in the film. The film can be destroyed and the characteristic austenitic structure of the steel can be revealed by continued etching. At 100 diameters.



limit depends more on contact limitations and heating of solutions than on electrochemical phenomena. The minimum current density required is significant and in general those processes characterized by low minimum current densities have marked advantages over those requiring high ones because it is much easier to get the current into the article being polished, distribution of current is better, and contact problems are less troublesome.

It has been observed, for example, in polishing wire baskets or racks that distribution of current to interior wires of relatively small diameter is attained only with great difficulty in processes requiring high current density, but the problem is not serious when conditions permit the use of low or moderate currents. The minimum current density depends on the work and electrolyte, and in some cases may be as low as 10 amp. per sq. ft. Usually, speed demands a higher current density, but for most metals and alloys it is possible to operate successfully at 1 amp. per sq. in. or less.

Voltage drop depends on the baths used, the current density, the temperature and anode and cathode spacing. Higher current densities usually demand higher voltages. In general, voltages are on the same order as in chromium plating, but for greater flexibility 12-volt generators are advantageous.

As previously pointed out, highly polarizing baths are necessary, and for that reason they usually contain only limited amounts of water. Higher water contents reduce the electrical resistivity of the bath, but increase the danger of etching. The proper balance must, therefore, be made. A great deal of attention has been paid to this feature of baths and it can now be reported that baths have been developed in which the water content, while critical, has a wide enough working range to be commercially practicable. Electrochemical considerations of polishing processes must be based on baths that have been used or "aged" because as soon as metal is anodically dissolved the bath is no longer the simple one started with. An important consideration in any commercial use of polishing methods is corrosive or poisonous fumes. This has been kept in mind, and none of the recommended processes have these objectionable features. Temperature, while important, is not necessarily critical. Usual temperatures are about 115 deg. to 160 deg. F. For greatest flexibility provision should be made for both cooling and heating.

To be successful, baths and operating conditions must be tailor-made. Having developed a satisfactory bath for a given metal, it still is necessary to determine the proper operating conditions including temperature, current density, rate of movement of the anode relative to the solution, and the anode-cathode spacing and arrangements. The aim at Battelle has been to correlate the necessary factors and to work out baths and operating conditions not only for different metals and alloys but also for various forms and shapes. Baths and conditions have been found for polishing plain carbon steel, stainless steels, including both straight chromium and chromium-nickel types, copper, brass, zinc, nickel, aluminum, monel metal, and other metals. Metals containing substantial amounts of graphitic carbon have not been successfully bright polished. While straight-chromium stainless steels require more restricted conditions for polishing than the nicked-chromium varieties, processes have been worked out for the former. Electropolishing has been successfully applied to various shapes, including wire, strip, sheets, forgings, stampings, castings, tubing, and intricately shaped objects.

Another operating factor is the life of contact materials. A commercially successful process must have long contact life, and baths and operating conditions that are otherwise successful may fall down for this reason. Racks, likewise, fall into the same category. This trouble has been successfully overcome. As an example, a bath has been developed which successfully polishes stainless steel but in which copper is so polarized that attack is substantially nil; so in this bath copper racks and bronze contacts give long life.

The cost of electropolishing other than labor is largely that of chemicals and power. The latter depends on the amount of metal that must be removed. The former is governed by the initial cost of the chemicals, by drag-out, and by bath life, which may be expressed in terms of the metal anodically removed. The chemical and the power costs per unit surface area treated depend also on the nature of the initial surface and of the finished surface desired. Knowledge of the chemistry involved is necessary to insure long bath life and to provide methods of rejuvenating spent electrolyte.

Scope and Limitations

The authors have found that many people are misinformed about the scope

and realm of usefulness of electropolishing methods. Many have the idea that electro methods are cure-alls. Electropolishing gains the same end as mechanical methods and in addition yields passivated surfaces, can be used on irregular shapes and is capable of producing novel finishes on rough or smooth surfaces. Best results are obtained when the initial or starting surface is good. There is no justification for expecting to start with a rough sand casting and end up with a smooth mirror-like finish, any more than to expect to start buffing the same casting mechanically without the prior use of grinding and polishing wheels and abrasives. However, the electropolishing of a sand casting will produce a brilliant rough surface that cannot be obtained mechanically. Also, it is quite feasible for the electrolytic method to polish intricate shapes that are difficult, if not impossible, to polish mechanically. In many cases of metal finishing, electropolishing alone will suffice; in others, it should be used in conjunction with mechanical methods. In some instances it may be necessary to follow electropolishing with mechanical buffing.

A common query is whether die marks are removed or accentuated. Those which are merely manifestations of cold working in forming are easily and rapidly removed. Markings which are actual scratches may be removed if they are not too deep. Electropolishing tends to round off sharp edges and to minimize the effect of scratches even though they may not be eliminated completely. Scratches that are not too deep can be removed completely, but their elimination necessitates removing a layer of metal considerably greater than the depth of the scratches. It cannot be stressed too strongly that electropolishing is essentially a *finishing* rather than a *roughing* operation.

Also, the question is frequently asked, "How long does it take to polish?" This cannot be answered in absolute terms because the amount of metal that must be removed depends on the surface to start with and the ultimate finish desired. As a specific example, with stainless steel strip it may be possible to get the required brightness by removal of 0.0001 in. of surface, but a stainless formed object may have surface blemishes that will require removal of 0.001 in. or even more. Unique and beautiful finishes that range from satin to mirror brightness may be obtained by proper adjustment of bath, operating conditions, and the amount of metal re-

moved. The amount of surface that must be removed also depends on the size, shape and contour of the work. A small rounded object like wire may be satisfactorily brightened and even polished by removal of enough metal to give a surface which would be entirely unsatisfactory on a larger shape or a flat surface. Sheets are probably the hardest objects to polish because in reflected light their flatness tends to accentuate surface defects that would be undetectable in formed objects. Bad surface defects, roll marks, crystal markings, etc., are most difficult to obliterate on shapes comprising large plane areas. As a perfectly general figure, but one that can be used as a rough approximation for ferrous alloys, copper, brass, and nickel, with a current density of 250 amp. per sq. ft., 0.001 in. of surface will be removed in about 12 min.

Stop-Off Lacquers Used

Electropolishing is particularly adaptable to intricate shapes and surfaces with crevices and cavities that are hard and expensive to handle mechanically. By selection of a bath of proper electrical characteristics and with the right cathode design, quite complex shapes can be handled satisfactorily. The process can be used as a finish *per se* and as a finish for a base metal to be subsequently electroplated. Specific applications of the latter are polishing brass and steel preparatory to nickel plating or polishing nickel preparatory to chromium plating.

Lacquers are available to stop off areas or sections that are not to be anodically attacked. Use of these also permits etched designs to be produced that are polished on the areas attacked. The raised areas can be either polished or natural as desired.

The chief axiom in considering application of electropolishing is to use judgment based on a knowledge of its limitations as well as its possibilities. It should be considered as complementary and auxiliary to mechanical methods. In some instances it will supplement and in other supplant polishing and buffing. In the end the choice all boils down to a matter of dollars and cents. Electropolishing resolves itself into adopting principles of applied electrochemistry employing tailor-made baths and operating conditions for different metals and applications. Success depends on intelligent use in the right places. But, there is no denying that many plants will realize substantial savings by using electropolishing methods of finishing.

STRAIGHT-LINE

THE Wheeling Steel Corp., at Steubenville, has just installed a group of new straight-line sheet galvanizing units, with a speed range of 10 to 135 ft. per min. This first complete installation of a combination of voltage control and field control of individual electric motors on the various components, gives the accurate synchronization that is so essential in this type of equipment.

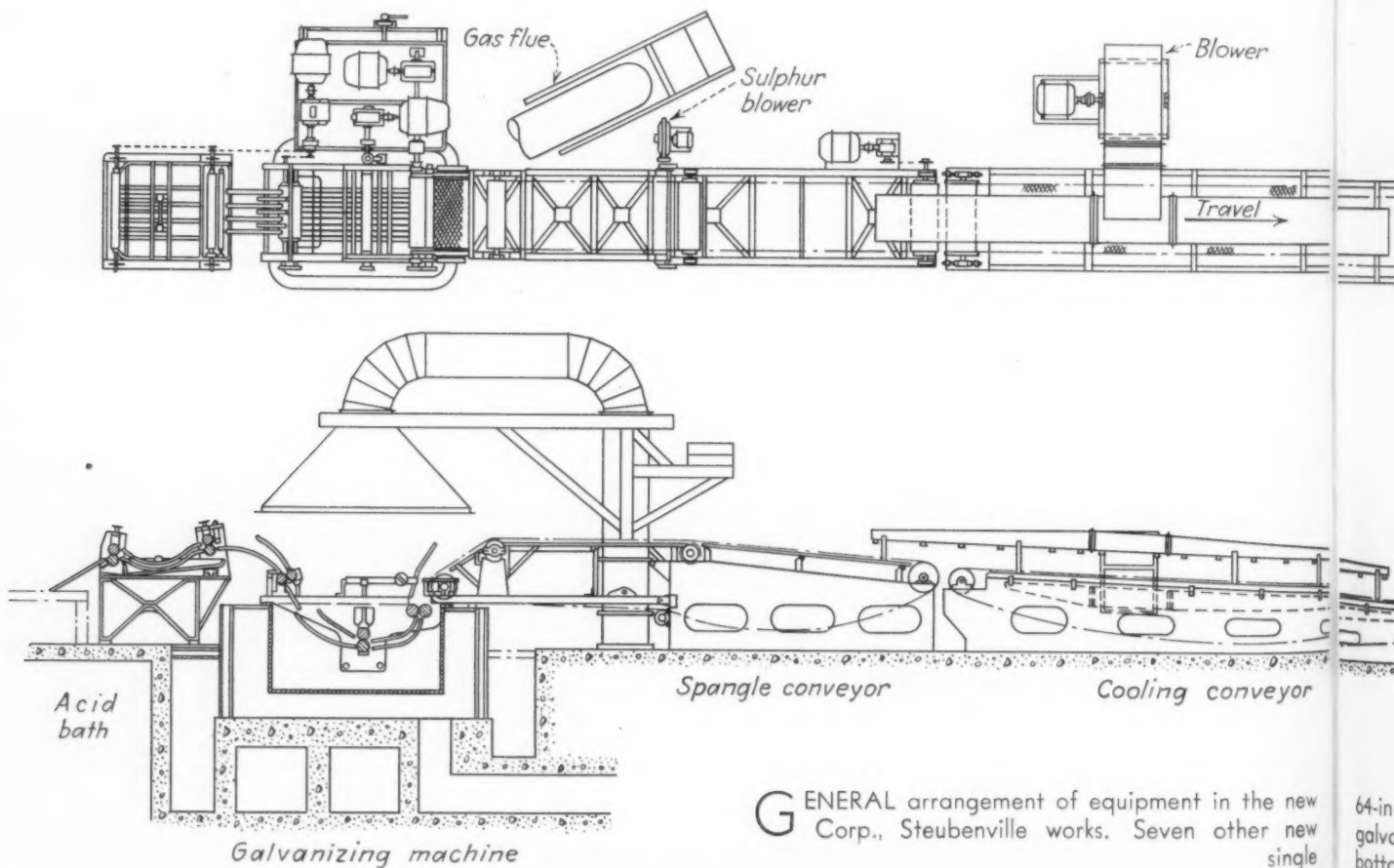
o o o

HOT dip galvanizing of sheets always has been a process requiring close control, both of the speed of the sheets going through the hot zinc and the temperature of

the zinc bath itself. Over the last few years a considerable amount of regulating and metering has been done on the control of the temperature of the zinc bath. Even more recently, how-

ever, attention has been turned to making available new and easier methods of controlling the speed of the sheets as they pass through the galvanizing lines.

The various units which are necessary in the manufacture of galvanized sheets, including the acid pickling unit, the galvanizing machine or rig, the spangle conveyor, cooling conveyor, washer and squeezer, drying conveyor, and finally, the roller leveler, have but recently been organized into a smoothly running team. With these various elements coordinated into a



GENERAL arrangement of equipment in the new Corp., Steubenville works. Seven other new single

64-in. galva
botto

SHEET GALVANIZING →

straight-line production machine, the flow of sheets is continuous from the galvanizing pot through the roller leveler and on to the storage racks.

Because the flow of sheets is a continuous process, it becomes absolutely essential that the various pinch rolls, conveyors, etc., be accurately synchronized with each other to give exactly the same lineal speed of strip for each unit. The principal pieces of equipment which require this synchronization are: (1) the entry or flux rolls, (2) the bottom rolls, and (3) the exit or coating rolls of the galvanizing

By **D. A. McARTHUR**
Chief Engineer, *Wean Engineering Co.,*
Inc., Warren, Ohio

and

R. A. GEUDER
Application Engineer, *Reliance Electric*
& Engineering Co., Cleveland

o o o

machine; (4) the spangle conveyor (in some units this may be a special conveyor through a furnace for mak-

ing a special product), and (5) the cooling conveyor, washer and squeezer rolls.

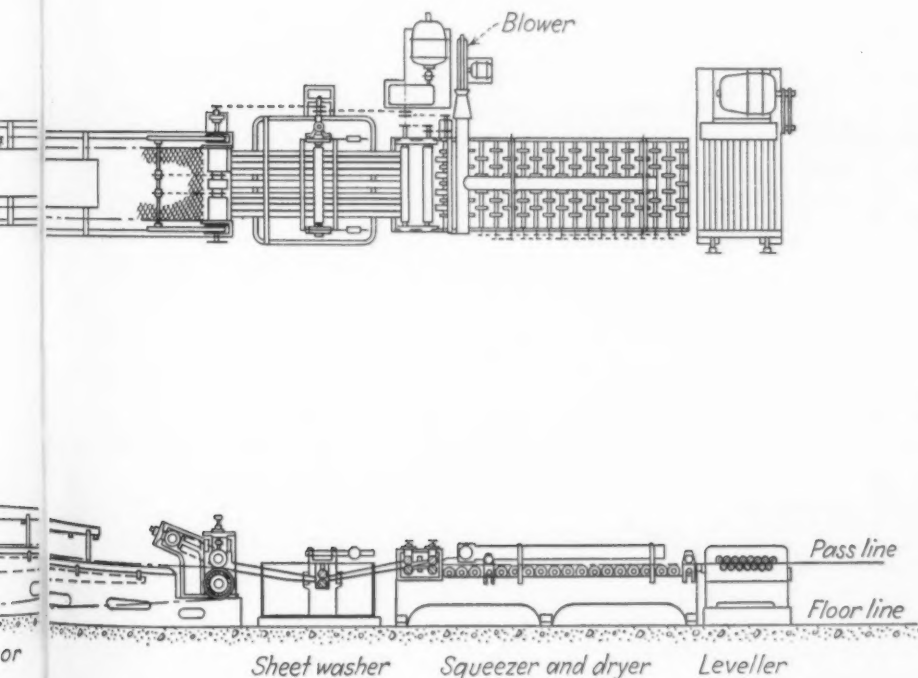
The final unit in an ordinary line, the roller leveler, need not be accurately synchronized, provided there is sufficient space between the leveler and the squeezer rolls to allow the sheets to free themselves from the latter before entering the leveler. In fact, it is an advantage to run the leveler faster than the line, due to the ease of piling.

It is absolutely essential that the first four units mentioned above be accurately synchronized with each other. If the first three are not accurately synchronized, the sheet will either buckle between the various sets of rolls and come out with a very bad shape, or will pull tight between the rolls and receive bad scratches from the guides. If the exit or coating rolls and the spangle conveyor are not properly synchronized, the material is likely to be scratched by the conveying means and if controlled spangles are being sought they certainly will not be of the type desired.

Roll Speed Changes

It is not always so important to synchronize the spangle conveyor and cooling conveyor. At times, however, the spangles are not properly set before leaving the spangle conveyor and in such cases it does become important to synchronize the speed of the cooling conveyor. In all cases the material is quite hot as it passes onto the cooling conveyor and is, therefore, very susceptible to scratching if the speed of the two conveyors is not identical.

Greatly complicating the problem of accomplishing this synchronization is the fact that the surface speed of the various rolls varies rather widely at



64-in. double bottom roll galvanizing line at the Wheeling Steel galvanizing lines include four 50-in., one 50-58-in., and two 58-in. bottom roll units.

the same r.p.m. This is due in part to the redressing of the various rolls, which must be done rather frequently—sometimes as often as once every 8 hr. for the exit rolls—and in part to the fact that the diameter of the same rolls varies to some extent during operations as metal and oxides are built up on their surfaces.

From this it can be seen that frequent changes of relative r.p.m. of the different rolls are necessary to keep the lineal speed of the sheet passing through them the same at all times. Older galvanizing drives have used change gears in attempting to accomplish this synchronization. This method is subject to the obvious disadvantages of, (1) having only a certain few speeds available, and (2) the difficulty of changing the gears while the machine is running.

By contrast, the method of driving each unit with a separate electric motor, which reduces mechanical parts to an absolute minimum, has proved extremely satisfactory for accomplishing the desired results. One other very important advantage is obtained by this type of drive; namely, each set of rolls in the machine can be stopped, started and reversed independently of the others. In the case of cobbles this is a very great advantage, both in preventing the entry of a new sheet into the machine where one is already cobbled, and in aiding in the removing of the actual cobble itself.

For the reasons that have been outlined, the multiple motor drive has proved very successful. However, the first installation of multiple motor drive used ordinary adjustable-speed d.c. motors and provided a speed range by electrical control of only 4:1. Since most galvanizing lines require a much large speed range, change gears or some similar device had to be installed to increase the speed range to be attained by the motor. This increased the cost of the mechanical equipment and added another point where chatter and undue wear could occur.

The final step in the simplification of the drive has been the use of variable-voltage control where very wide speed ranges of as much as 13:1 can be obtained without any change whatsoever in the mechanical setup and without the necessity of interrupting operations.

The recent installations of the Wheeling Steel Corp., (Steubenville works) are, so far as is known, the first complete installations of a combination of voltage control and field

control of electrical motors on galvanizing lines. They represent a substantial simplification in the mechanical equipment required. At the same time, this type of electrical control has turned out to be considerably cheaper than more conventional combinations of wider, adjustable-speed motors and mechanical speed changers.

These new galvanizing lines were purchased to cover a speed range of from 20 to 120 ft. per min. In actual practice they have been operated successfully over a range from 10 to 135 ft. per min. Because of the atmosphere around the galvanizing pots and spangle conveyor, as well as around the first part of the cooling conveyor, it is usually deemed advisable to use fully inclosed, fan cooled motors. On some installations the exhaust fan system for taking away the corrosive fumes has been entirely adequate to keep the atmosphere relatively clean. This, however, is the exception rather than the rule, and to insure complete safety, fan cooled motors are generally

used—and were used on the Steubenville installations.

As has been said, the galvanizing operations is a continuous process, when making a change in the speed of the line, therefore, it is necessary to bring the several units comprising it up or down in step together. In the past, rather elaborate and expensive inter-connecting controls have been required to enable the operator to adjust all units simultaneously while at the same time keeping them in synchronism.

Speed Range 13 to 1

It was, consequently, with a view to simplifying these operating conditions, that work was undertaken to apply a system of variable voltage control to the individual elements composing the modern galvanizing production line. The original line was expected to cover a speed range of about 6 to 1. However, the flexibility of voltage control, as worked out for the operating cycle desired, has made it possible to





• • •

THIS new galvanizing department at the Steubenville works of the Wheeling Steel Corp. is one of the most modern in the industry. Provision has been made for future expansion with additional divisions of four units at a time being added as required. Corrugating equipment is also included in the new department.

• • •

secure a speed range of over 13 to 1, and this has been successfully used since.

The speed of the entire galvanizing line is at the control of the operator, who has merely to operate a "fast" or "slow" push-button station to speed up or slow down the entire line in perfect synchronism.

Vernier field rheostats have been supplied for several of the units. They have served not only to secure the initial adjustments, but to make it easy to obtain such additional modifications in adjustment as may be desired from time to time to realize the best operating conditions.

Fully inclosed, fan cooled motors have been used on all of the units of this variable voltage system. The selection of a combination control for the motors takes into account not only the range of speeds to be covered, but also the high ambient temperature with which the motors must be prepared to cope when operated at very low speeds and reduced voltage.

The main motor-generator set which supplies variable voltage energy to the galvanizing line is located some distance away and its control, which includes a motor-operated rheostat, is placed near it for convenience. At the galvanizing line itself there is a small operator's panel on which are provided the ordinary start and stop features and the speed control of the entire line. In addition, a means of reversing the entry rolls of the galvanizing pot is provided without disturbing the steady flow of sheets through the remainder of the line.

The combination of voltage control and field control was worked out fully after it had been determined that fully inclosed, fan cooled, adjustable speed motors, with a 6 to 1 speed range by field control, even though they can be successfully built, would have cost far too much to justify their application to this equipment. The motors which have been installed are provided with a field control, part of which is used in the galvanizing pots to compensate for wear on all the rolls, and the rest

combined with voltage control to obtain the total desired range of operating speeds.

The galvanizing pots in these new lines have three motors. One handles the entry rolls, the second drives the bottom rolls, and the third operates the exit rolls. It is necessary that the speed relationship of these motors remain substantially constant so that the sheets, as they go through the pot, will not be pulled tight against the upper guides or allowed to go slack against the lower guides. Ten hp. 850 to 1700 r.p.m., type T, Reliance motors are used and according to test are liberal in size for the application—a desirable condition because of the high ambient temperature, the good regulation required, and because they are fully inclosed, fan cooled, and must operate below normal speed. However, it has been found possible to take some advantage of the constant torque characteristics of the load and have superimposed the field control range on the voltage control range in such a way that as the speed goes below about 60 r.p.m., the motors will be operating on about half normal armature current, substantially reducing the resultant heating.

Equally liberal sized motors have been applied to the spangle conveyors, and to the combination drive for cooling conveyor, washer, squeezer, and drying conveyor.

All the motors in the line, with the exception of the one which drives the roller leveler, are operated from a voltage-controlled 30-kw. motor-generator set. The roller leveler motor is a 25-hp. 400 to 1600 r.p.m. adjustable-speed type and does not operate off the voltage control scheme because synchronization at this point is not particularly essential, other than that it is desirable to have the roller leveler always running somewhat faster than the drier conveyor. Moreover, it is not necessary to have so wide a speed range on the roller conveyor as on the rest of the line, and therefore it has been divorced from the voltage control scheme.

Operating results with the new production line have been particularly satisfying. The synchronization of the several units in the line, using the variable voltage control system, has relieved the operator from an otherwise difficult and confusing multiplicity of duties, and has made it possible to do a consistently uniform job of sheet galvanizing.

Machine Gas Cutting

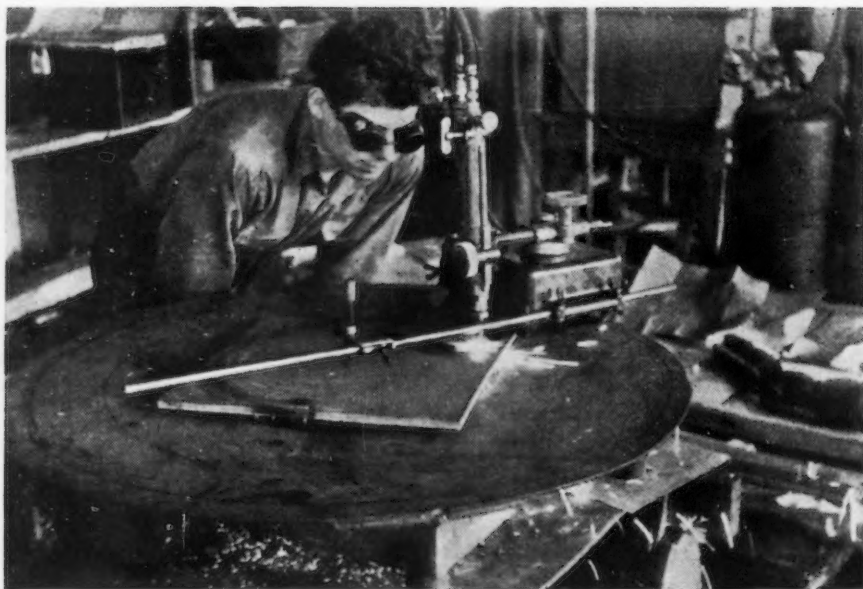


FIG. 1—Machine gas cutting an 18-8 Ingaclad steel plate. Cuts are made from the mild steel side, and abnormally low oxygen pressures are used.

BOTTLE capping machines built by the Crown Cork & Seal Co., Baltimore, incorporate a "crown-revolving wearing plate" made of 18-8 Ingaclad steel plate. Until recently a trepanning set-up was employed for cutting the plates to finish into rings measuring 14 $\frac{23}{32}$ in. in outside diameter and 5 $\frac{23}{32}$ in. inside. After some experimenting a machine gas cutting technique was developed and is now in regular use.

As purchased, the clad plates are 16 in. square and $\frac{7}{16}$ in. thick, with the stainless steel portion 0.35 in. thick. For the gas cutting, an Airco No. 10 Radiagraph set up as shown in Fig. 1 is employed. Before cutting, $\frac{1}{4}$ -in. diameter starting holes are drilled in the clad plate for both the inside and outside flame cuts.

On this type of steel it is necessary to cut from the *carbon steel side* for the reason that stainless steel does not oxidize readily, and it is important to

utilize the iron oxide of the carbon steel base to accelerate oxidation of the stainless steel, in order to neatly sever the entire plate thickness. Because of the need of utilizing the iron oxide to complete the cut, the machine speed and the oxygen and acetylene pressures are necessarily critical.

Torch Set-Up

On this particular thickness of plate ($\frac{7}{16}$ in.) it was found that cuts such as pictured in Fig. 2 are obtainable, by using a torch speed of approximately 17 to 18 in. per min., and a style 124 No. 1 cutting tip raised approximately $\frac{3}{8}$ in. from the plate with a soft neutral flame adjustment. Acetylene pressure of 2 lb. and oxygen pressure of 14 lb. are used through 8400 series regulators.

The plates are neatly severed and the kerf is quite narrow. The slight amount of slag left on the stainless side is easily removed, and on sub-

sequent machining no excessive hardness has been noticed as resulting from the flame cutting. Furthermore, there is virtually no discoloration of the highly polished stainless surface.

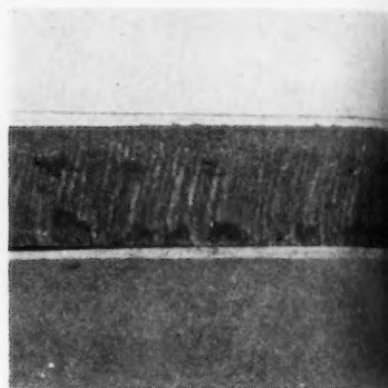


FIG. 2—Gas cut section of $\frac{1}{2}$ -in. resulted from the flame cutting, and highly polished

When stainless-clad steel is to be used in the "as cut" condition, it has been found that a very thin solution of "Handy" flux painted on the stainless side and allowed to dry thoroughly before cutting helps to prevent discoloration.

Small-Quantity Cutting

On similar work where time and quantity of material to be cut does not permit adequate set-ups, cuts of good quality can be consistently obtained by a slight departure from the torch technique described in the foregoing. This is, setting the torch at approximately 15 deg. from a vertical position and pointing in the direction opposite to torch travel. Use of a low oxygen pressure for the thickness to be cut with the inclined torch results in a greater amount of iron oxide and more time for reacting on the slowly oxidizing stainless steel.

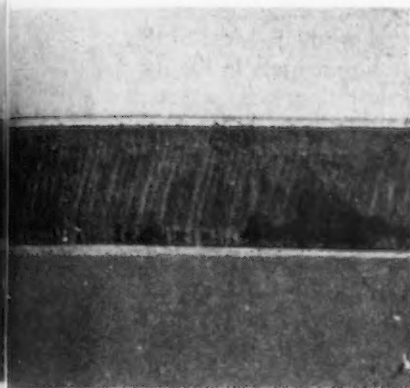
Definite obstacles present themselves

of Stainless-Clad Plates

in this type of cutting, however, the foremost being a "foaming" condition noticeable on the surface of the plate being cut. The mild steel is being severed but not the stainless on the

By W. LYON and M. G. WICKER

*Serviceman and Sales Engineer
Respectively, Air Reduction Sales Co.,
Philadelphia*



stainless clad steel. No excessive hardness there was virtually no discoloration of the stainless surface.

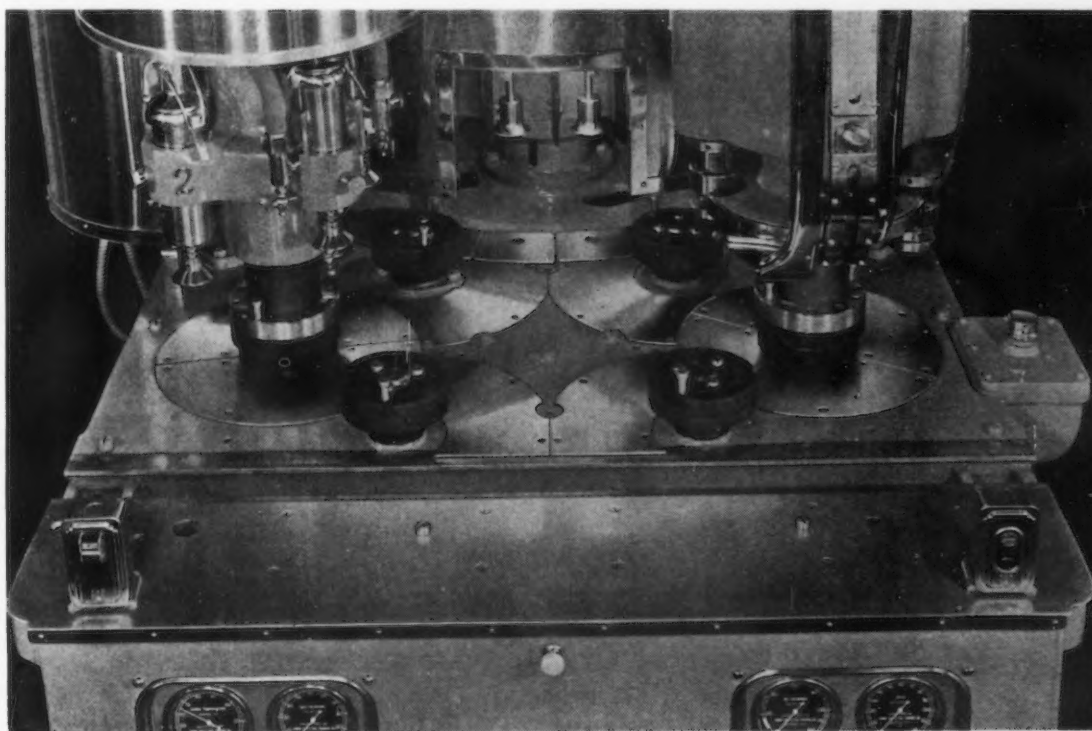
bottom side. This condition can be caused by: (1) Use of excessive pre-heat flames, which cause the two different metals to separate ahead of the cutting jet; and (2) too high an oxygen pressure, which results in the same condition in that the iron oxide is blown through at too high a velocity, thus losing the oxide and the cut.

It is to be noted that abnormally low oxygen pressures are in order. In later lots of this clad steel it was found that the thickness of the stain-

less varied and caused trouble unless torch speed and pressures as well as tip sizes were changed to correspond with the thickness differences. It should also be said that machine gas cutting must be used for smooth torch cuts because hand cutting is not sufficiently steady to satisfy most commercial requirements.

Although actual cost figures are not as yet available, it can be said that the machine gas cutting of these stainless-clad steel "revolving wearing plates" has resulted in considerable savings.

FIG. 3 — Replaceable stainless steel wearing plates protect the expensive housing of CEM syrufer-filler-crowners from the abrasion of sliding bottles. The two semi-circular plates shown under the crowner are those rough cut by the machine gas cutting method.





CONTINUOUS CASTING

By

T. W. LIPPERT

Metallurgical Editor, The Iron Age

ALL the machines described last week dealt with continuous casting in which the mold wall is stationary with respect to the metal flow, with the exception of the reciprocating Junghans mold, which is a kind of in-between affair. And all these machines turn out rods, billets or ingots. As mentioned in the beginning of this article, the original Bessemer idea was of pouring metal between two turning rolls, that is, the roll surface is moving at about the same speed as the metal produced. This type of direct casting turns out strip or sheet.

This original Bessemer idea has within the past decade been pretty well dominated by several designs of machines by Hazelett, of Hazelett Metals, Inc., New York. Just recently a simple high-speed Hazelett machine has been used experimentally to a great extent, the speeds of strip production being of the order of 500 ft. per min. Many trial runs have been made with both silicon steel and various analyses

of stainless alloys, and for the latter particularly there has developed a great interest, based no doubt on the large market for stainless steel in strip form. Just several weeks ago one of the leading steel producers supervised a trial run on this new ring mill for 18-8 stainless steel, the strip produced being 8 in. wide, 0.017 in. thick, and continuously cast at the rate of 450 ft. per min. The edges were quite clean and required only about $\frac{1}{4}$ -in. trim. After passing along for further processing this strip was reported on as follows: "After some amazing and rather puzzling complications (mostly in annealing), the final rolled product obtained was comparable in every way with the product turned out by conventional methods."

For a number of years Hazelett directed his attention to a casting-rolling mill, wherein the metal is cast and given a sizable reduction by the same set of rolls. A number of full-size commercial units of this type have at one time or another been experimented

LAST week detailed descriptions were given of the various continuous casting units now in commercial production or undergoing extensive experimentation, namely the Junghans, Williams, Eldred, Poland, Aluminum Co. of America, and other processes. The end product of such machines is either billets or ingots. Herein, the description of recent work on continuous casting is concluded, with detailed data on recent machines turning out strip as an end product. Most of this discussion centers in the new Hazelett ring mill, although some details on other methods are included.

with, and both the construction and performance of this design has been previously described in detail. (See THE IRON AGE, March 21, 1935; Oct. 15, 1936.) Essentially the mill is not unlike the original Bessemer sketch reproduced on page 46. There are two steel rolls, cooled externally with water sprays, between which liquid metal is poured. With the rolls turning and a pool of molten metal maintained between them, two continuous strips of metal are cast (one on each roll), the two being pressed together and given a certain degree of reduction at the nib of the rolls.

At the Scovill Mfg. Co. this type of Hazelett casting-rolling mill produced substantial tonnages of 12-in. wide, sound brass strip, having good physical characteristics, and in strips weighing up to 3000 lb. The metal was sound, and costs were low, but red stains frequently blemished the surface, due to segregation of the low-melting-point constituent of the brass. This staining had no serious effect on the metal physically, but it did make the product unsalable where high finish or chromium plating was required. Sometime later the Crown Cork & Seal Co. used a Hazelett machine for the production of aluminum strip. Here again large quantities of strip 24-in.

wide were produced, sound and of accurate gage. But still there was segregation (copper) difficulties.

Hazelett then came to the conclusion that the rolling of alloys had its disadvantages because of segregation inherent in the operation of this type of casting-rolling mill. This segregation came about because of irregularities in cooling, due to a folding of the frozen films in contact with the rolls, which, in turn, was due to the fact that the frozen film did not travel at exactly the same speed as a point on the roll. At the pass, where high pressures were applied to the partially chilled alloy, the lower melting point constituents of the alloy were forced into the places of least cooling and least pressure.

The most refined work on one of these casting-rolling mills was completed recently by the American Metal Co. in conjunction with the Scovill Mfg. Co. In this work, efforts were confined to a pure metal—copper—which, of course, would not be subject to segregation. There was devised a carefully developed system of controlled atmosphere in the furnace and runners, by means of shrouds about the mill itself, in order to produce oxygen-free copper strip. The metal so obtained (so-called OFHC copper) was excellent from a metallurgical standpoint.

To summarize, therefore, the casting-rolling mill had a fairly low speed, on the order of 15 to 50 ft. per min.; there were segregation difficulties when rolling alloys; thin gages could not be produced; and for the rolling of carbon and alloy steels the problem of roll maintenance was quite serious.

Hazelett came to the conclusion that to solve the problem of segregation the metal should be poured first on one cooling member and be allowed to chill almost throughout its thickness and then surface-rolled to chill and compress the very small film of unsolidified metal. To do this, it was necessary to form the bath on one surface instead of between two rolls, as theretofore. This is achieved in the new type of ring mill by pouring molten metal on the outside of a large rotating ring. This surface first has to be degassed, in order to get a sound metal, and then cooled at high rates for continuous production. This has been achieved in the type of mill sketched on page 46.

It will be noted that the mill is essentially a vertical steel ring supported by horizontal rolls, the top one of which is driven. Co-acting with the ring is a topping (or surfacing) roll which may be driven. The surfacing

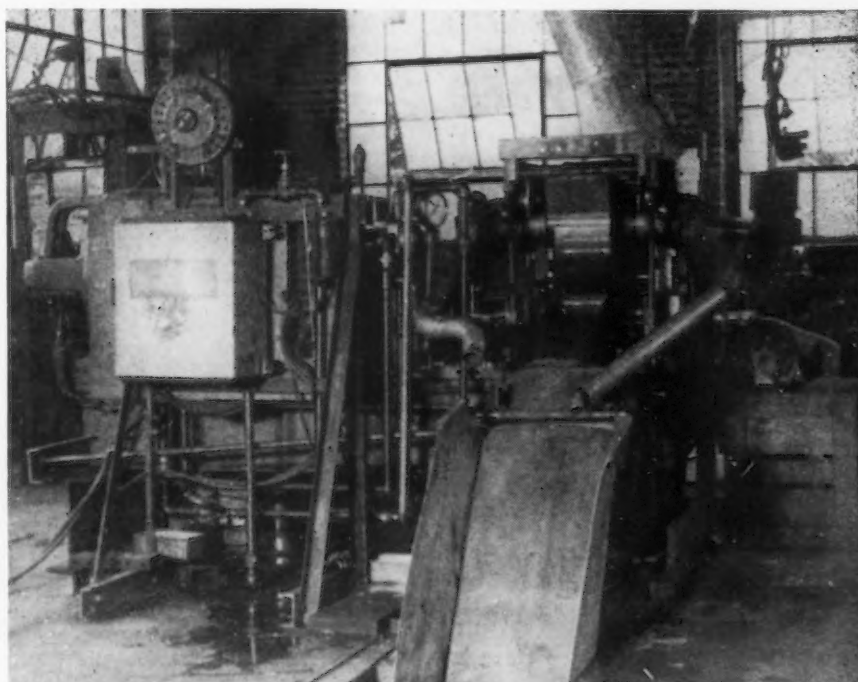
roll floats (under pressure) on top of the ring, and the molten metal is so poured as to pass between the two. A distributor serves to conduct molten metal from a source of supply to a point between the roll and the ring. With the rolls in motion and fluid metal introduced into the distributor, the metal solidifies between the roll and ring and, after following the latter for a very short arc, is removed in a continuous strip at a speed of about 500 ft. per min. This type of mill produces very thin strip, say 0.02 in. thick, and in widths up to 8 in., although considerably wider mills are visualized.

The molten metal poured on the ring gives up the major portion of its heat of fusion thereto. This ring is not expensive to make, and it can be 20 ft. in diameter, if desired, and presents such a very great amount of cooling surface that high speeds and high production can be obtained. In order to avoid large amounts of scrap at the beginning of the heat, it is necessary to de-gas the ring by pre-heating it. For an upper roll, to surface the product, an internally cooled roll has been used, having extremely thin walls, as low as $\frac{1}{8}$ in., shrunk on splined shafts. Even a roll as small as $2\frac{1}{2}$ in. in diameter with $\frac{1}{8}$ in. wall will run continuously at the high speeds without heating up, if sufficient quantity of water at sufficient pressures is forced through it. The power required on this ring

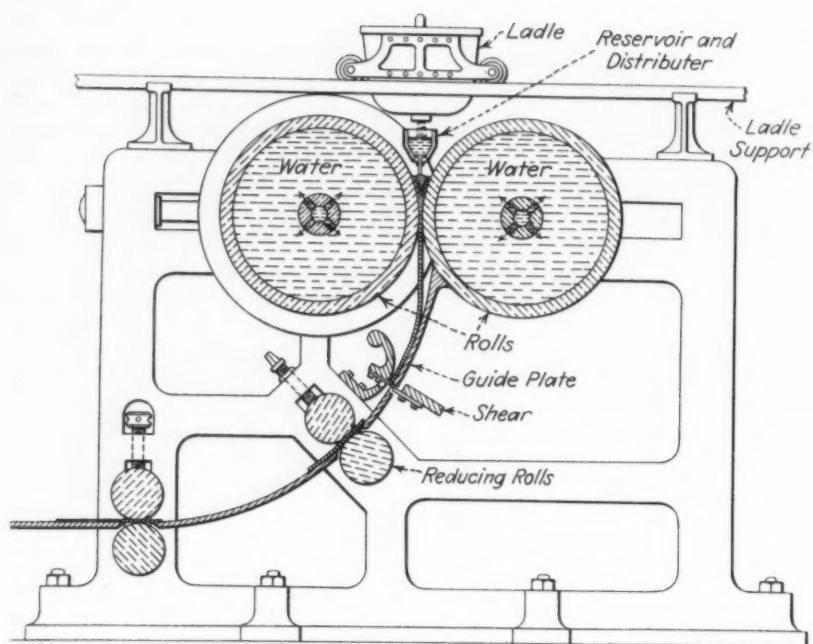
mill is not large, running only 3 to 15 hp. per foot of width, depending on the metal being rolled. In the older type of casting-rolling mill the power was of the order of 75 hp. per foot of width. The ring mill uses no side dams to control the width of the strip—the width is controlled by the rate of metal flowing from the distributor.

The writer observed several heats of metal poured on this ring mill. One casting was of strip $\frac{1}{8}$ in. wide at the rate of about 500 ft. per min. The edges of this strip were slightly ragged; the edge gage was 0.019 in. and the center gage was 0.021 in. Samples of the metal as-cast showed the following analysis: 73.15 Cu, 0.20 Pb, 0.04 Fe, 0.003 Ag, and 0.005 Ni, the remainder Zn. Samples were given a tensile test and showed a maximum of 39,600 lb. per sq. in., a minimum of 34,200 lb. per sq. in. and elongation in 2 in. of 16 and 12 per cent respectively. These tests were not entirely satisfactory as the specimens broke in the fillets. Further samples were annealed for 1 hr. at 1380 deg. F. and on testing showed a maximum tensile strength of 37,200 lb. per sq. in., and a minimum of 33,900 lb. per sq. in., and an elongation of 31 and 24 per cent respectively. These were good breaks.

Samples were then cut from the strip and observed microscopically, with the results shown by the photomicrograph on page 47. The inside surface of the sheet as-cast

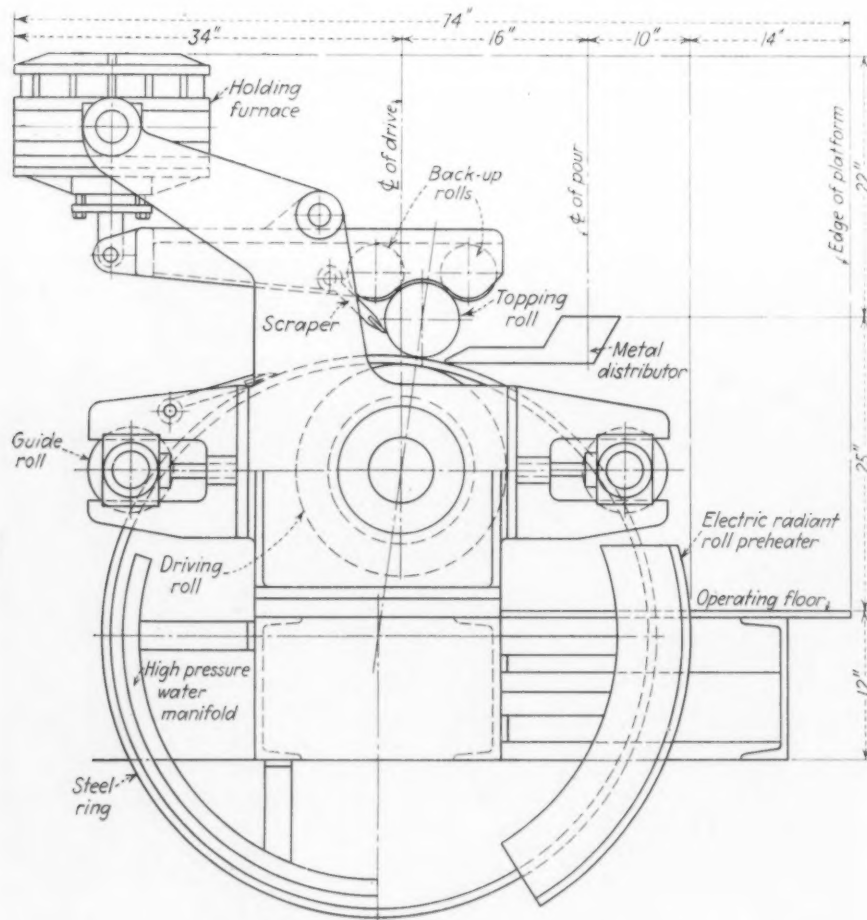


EXPERIMENTAL continuous casting ring mill in the Hazelett laboratories. The topping roll and section of the ring may be seen (right-center). See sketch on next page.



BESSEMER'S original sketch for the continuous rolling of strip from liquid steel. Norton's machine (1890) and Hazelett's machine (1925-35) were very similar in over-all operation, although minor construction details differed.

o o o



DETAILED sketch of Hazelett's new ring mill for the continuous casting of liquid metals. Stainless steel strip 8 in. wide has been cast on this type of mill at speeds approaching 500 ft. per min.

had a structure between a cast and rolled one and was very irregular. The outside surface as-cast had a structure more nearly approaching a rolled structure. The unannealed metal showed a large variation in structure which was removed to a large degree by annealing. After annealing, the strip was pickled and given a reduction to 0.012 in. in one pass. The strip, as cast, had a somewhat darkly mottled surface which disappeared after annealing and pickling, so that after rolling the surface appearance was entirely normal.

Another test was observed by the writer at a later date, in this instance strip nearly 8 in. wide, 0.021 to 0.024 in. thick, was rolled at a speed approaching 600 ft. per min. An analysis of this metal showed 73.14 Cu, 0.005 Sn, 0.2 Pb, 0.05 Fe, 0.005 Al, and the difference zinc. The surface of the strip had a number of dark areas, was somewhat rough to the fingers, and showed a number of small blisters. Pickling of the strip removed about all of the dark areas and cold rolling closed up about all the blisters, leaving a smooth surface. No Erichsen cup tests were made, so it is not known whether these blisters would open up on working.

The as-rolled strip was cold rolled to 0.015 in. thick and to 0.010 in. thick. The cold rolled strips were annealed for 10 min. at 1100 deg. F. and air cooled. Rockwell B hardness was 17 for the as-cast material, 68 for the strip cold rolled to 0.015 in., and 77 for the strip cold rolled to 0.010 in.

Microscopic examination showed areas of small grains. While the small grain areas were always present, they often strayed from the center to the surface and back again. Coarse grained surfaces were found to be somewhat dendritic. The lead distribution was uniform, and the inclusions tended to keep to the fine grained areas. The 0.010-in. cold rolled strip after annealing showed a complete recrystallization and a fairly uniform grain size. To summarize, the strip cold rolled 50 per cent and then annealed was generally comparable to ordinary commercial brass, although cupping tests would be necessary to determine suitability for forming and drawing.

Thus is the status of the Hazelett high speed ring mill today. Its performance to date has been promising for non-ferrous metals and to a certain extent with silicon and stainless steels. For the latter, however, full technical reports are not yet available, and therefore no type of judgment can be rendered.

○ ○ ○

COLOR reproduction of Hazlett ring mill rolling brass strip direct from liquid metal at a speed of about 500 ft. per min. This illustration is blown-up from a small motion picture color film, which accounts for the lack of detail.

○ ○ ○

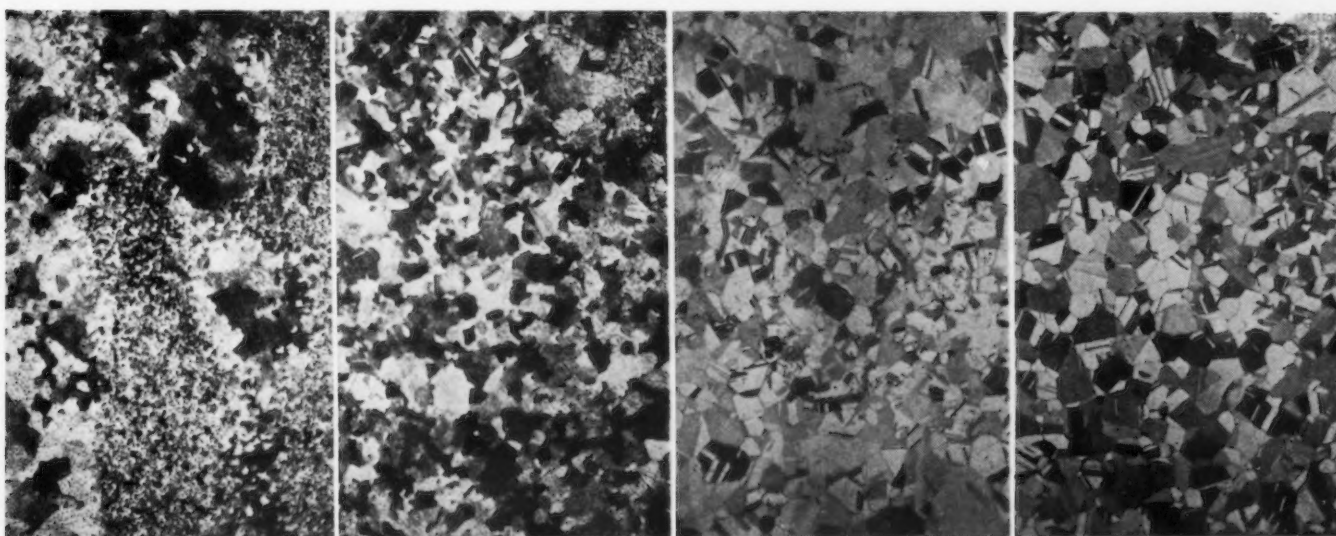


Within the past several years there have been several other direct casting mills experimented with of the general Bessemer-Norton-Hazlett type. For instance, J. M. Merle, a French inventor, conducted tests over a year or so at the Pittsburgh plant of a large steel producer, for the production of strip mostly of the silicon steel analysis. The writer has never seen this mill, but understands that it was something on the order of a spider supporting a copper ring, somewhat like a wheel. It is believed that the ring had raised edges to confine the metal, and the top surfacing roll was rigid rather than floating. Silicon steel strip was cast on this unit, but how the machine performed mechanically or how the steel was metallurgically, the writer cannot state. In any case, so far as is known little experimenting is now being done. The only Merle patents the writer knows about are 2,129,702 and 2,129,703, which are concerned mostly

with feeding molten metal on a rapidly rotating disk, from which the metal flies in an atomized form into a mold and builds up into a solid form of the shape of the mold. It is understood, however, that additional patent applications are on file, and that soon the Merle Metals Engineering Co. will license for continuous thin and thick ferrous and non-ferrous strip, slabs, bars, etc.

In England, F. J. Kohlhaas proposed a process of this general type. And, in the U.S.S.R. there has been considerable interest in the continuous casting of metals by means of rolls. S. F. Gerasimov (Liteinoe Delo, No. 4, 1937) describes the method of rolling cast iron performed experimentally by Professor Ulitovsky of the Leningrad Institute, whereby molten iron is allowed to flow down a graphite chute into two revolving rolls. The resulting sheets, of a thickness of 0.012 and 0.024 in., were hard and brittle,

but after annealing at 1380 deg. to 1560 deg. F. they were soft and flexible. Also, J. G. Kullatschic, of the Sickel & Hammer plant, reports (Theory and Practice of Metallurgy, No. 3, 1937) that work on liquid rolling of metals is being worked on in Russia and that the success of the process will be first with alloy steel and not with ordinary carbon steel. He also prophesies "we may say with certainty that the Soviet 'Sojus' will be in a position during the third five-year plan, with dutiful consideration toward this problem (liquid rolling) on the part of the scientific research organizations and the academy of science, not only to industrially acquire the rolling of liquid steel, but also to give this problem new direction. After the 'Sojus' possesses this process and also the American practice, which is known to us, we will be in a position to solve and adopt the process."



STRUCTURE of brass rolled on the Hazlett ring mill, at 75 diameter. From left to right: inside surface of the sheet as-cast, after polishing and etching, the structure being between a cast and rolled one and very irregular; outside surface as-cast, and more nearly approaching a rolled structure; inside surface as annealed at 1382 deg. F.; outside surface as annealed at 1382 deg. F. Note that the large variation in structure is removed to a large degree by annealing.

DOCUMENTARY

(Continuous Casting of Liquid Metals Into Ingots, Billets, Sheet, Strip)

Continuous Sheets of Malleable Iron and Steel Direct From Fluid Metal

By SIR HENRY BESSEMER, F.R.S.

AMONG the numerous inventions that are from time to time brought under public notice, a certain proportion are from some cause or other allowed to fall out of sight and be forgotten. This too frequently happens from some inherent defect or fallacy involved in the scheme itself. It is not, however, always the cause, for some inventions, which appear well worthy of a trial, are never put to any practical test, through having appeared at a time when the state of the particular manufacture to which they apply was not so far advanced as to render the proposal feasible with the then existing state of knowledge, although at a later period and a more advanced state of the arts, they would at once have been adopted. Hence it has occurred to me that an invention in connection with the iron and steel manufacture which has quietly slept in oblivion for the last 35 years might with advantage be discussed at a time when the manufacture of tin plates is occupying so much public attention. I have nevertheless felt much hesitation in venturing on this innovation, which need not be made into a precedent.

The production of continuous sheets of different materials, direct from fluid or semi-fluid matter, occupied much of my attention a great many years ago; and as far back as the year 1846, I took out a patent for the production of tin foil and sheet lead direct from the molten metal. I may also add that I received, about two years ago, a parcel from America containing a small sample of sheet metal, which was being successfully manufactured there. The person from whom I received it (probably from Fluid Metal Rolling Co., information about which appears later herein—Ed.) informed me that it

was made by a slight alteration or improvement on my patent of 1857, for rolling continuous sheets and thin bars of iron or steel direct from fluid metal. He offered me one-half of his patent if I would undertake its introduction into this country. I did not accept his offer, and there the matter rested.

The circumstance stated has, however, afforded me an opportunity of showing you a small sample of a continuous sheet, produced direct from fluid metal at a single operation, and proves beyond doubt or question the important fact that fluid metal may be chilled and formed into a continuous sheet between rolls that are kept cold, while it well illustrates the spirit of enterprise of our American cousins, who are so prompt to recognize, to adopt, and to improve upon the inventions brought forward in Europe.

In August, 1856, I first announced to the world the fact that malleable iron in a molten state could be produced rapidly, and in large quantities. It is not surprising that I should have at once endeavored to avail myself of the advantages which this novel condition of fluidity presented. I saw, of course, that like other fluid metals, malleable iron could be cast in molds into any desired form, and reverting to my former inventions for rolling fluid lead and glass into continuous sheets, I at once grasped the idea that malleable iron or steel could be thus made, not only into sheets and plates, but also into thin bars or rods, by passing the fluid iron in between a pair of rolls placed in the same horizontal plane.

I was most anxious to bring to the test of experiment a system so novel, and so immensely important if successful.

At the period mentioned, I was car-

rying on a secret process of manufacturing bronze powder at my works at St. Pancras, where I was also making my iron and steel experiments; and in the bronze works I had in daily use a pair of 12-in. chilled-rolls placed in the same horizontal plane as represented in the diagram. (See sketch on page 46 herein—Ed.) I saw at once that these rolls would enable me to make such a trial of the scheme as would prove the possibility or otherwise of producing a continuous sheet direct from fluid iron. Unfortunately these rolls were working at some distance from the model converting-house, and in a room that was carefully locked and guarded, and into which no strange workmen could be permitted to enter. I therefore had to depend entirely on myself for these experiments. I employed a common 20-lb. crucible as a converter, and after melting 6 or 8 lb. of pig iron in it, I immersed the orifice of a fire-clay blow-pipe in the metal, which was by this means wholly decarbonized. No manganese or spiegel was added to it.

I then seized the crucible in a pair of tongs and ran with it into the bronze works. This naturally occupied some little time to accomplish, and, when I arrived at the rolls, the metal in the crucible had assumed the solid form, and could not be poured out. After several unsuccessful attempts, I at last succeeded in reaching the rolls with some fluid metal. The crucible was lifted on to the back roll, and the molten iron was poured in between them. The rolls were set at about 1/30-in. apart, and a thin sheet was obtained some 3 on 4 ft. in length. The small stream from the crucible did not spread itself far along the wedge-shaped space between the rolls, and as the quantity poured fluctuated a little, so the breadth of the plate increased or decreased in the same ratio, giving an undulating line to the edges of the plate, some portions of which were afterwards rolled to a thinner gage.

The sheet thus produced had a clear surface, almost wholly free from oxidation, and absolutely free from scale. It was as tough as any rolled iron plate I had ever seen; indeed, it left no doubt in my mind of the entire

success of this system of rolling thin sheets direct from fluid metal.

The thin plate was cut into small samples, and given to different persons. The only relic now remaining of it is a small piece among other early examples of Bessemer metal, contained in a glass case at the offices of the Institute, where this small piece of the original plate may be seen (illustrated on this page—Ed.).

So impressed was I with the importance of this invention, that I immediately applied for and obtained a patent for it, notwithstanding that at this particular time the Bessemer process was not merely under a cloud, but was regarded by the trade generally as an absolute failure. One need not, therefore, be greatly surprised that the production of continuous sheets direct from fluid iron did not excite a great amount of enthusiasm in the minds of tin plate manufacturers of that day; in fact, the whole scheme was simply pooh-poohed and laid aside, without any serious consideration of its merits.

These suggested improvements will be readily understood by reference to the annexed diagram (see sketch on page 46 herein—Ed.); and here I beg to observe, that I have not gone into the many details necessary for the construction of rolling mills of this description, but have merely given such an illustration of the general scope of my proposals as will enable them to be understood.

The rolls consist of two hollow drums through which a tubular steel axis passes, and conveys a plentiful supply of water for keeping the rolls cool.

The brasses which support the one roll are fixed, while those which support the other roll are movable in a suitable slide, and are pressed on by a small hydraulic ram, which is in free and uninterrupted communication with an accumulator, so that at any time should the feed of metal be in excess, the one roll will move back and prevent any undue strain in the machinery, the only result being a slightly increased thickness in that part of the sheet of metal, a defect which as it extends parallel across the whole width of the sheet, will be easily corrected in the next rolling operation.

The rolls, by preference, may be made of 3 or 4 ft. in diameter, each having a flange on one end only, and thus forming a trough with closed ends for containing the fluid metal.

In order to obtain a regular and quiet supply of metal, I employ a

small iron box or reservoir, lined with plumbago or fire-clay, along the bottom of this reservoir. Some 10 to 20 small holes, about $\frac{1}{4}$ in. in diameter, are neatly molded by a row of conical brass pegs. And here I would observe that the reservoir should be well dried, and its interior surface heated to redness prior to its use.

A pair of rails are supported on the roll frames, and serve for the conveyance of the ladle, which is mounted on wheels, and brings the metal direct to the rolls, or to any number of pairs of rolls that may be placed in line.

The ladle is provided with one or more valves or stoppers of the usual kind, by means of which the supply

extent ever required during the rolling process.

The thin sheet of metal, as it emerges from the underside of the rolls, is received between the curved guide plates, to one of which a cutting blade is bolted. Beneath the guide plate a similar cutting blade is arranged to suddenly move forward by a cam and cut the thin sheet in two, the piece so cut afterwards passing between the second pair of reducing rolls, from which it again descends by gravity, and passes between the third pair of reducing rolls, and is delivered on to a horizontal table, or it may be allowed to slide down the inclined end of a cistern of water, moved slowly

This small Specimen is all that now remains of a long sheet of Tin-plate Iron, made at Baxter House, about October, 1856. Patented January 24th, 1857. It was made by pouring fluid Malleable Iron in between a pair of 12 inch chilled rolls. The thin sheet so obtained was once more passed through the rolls and thus brought to its present thickness. The end of this piece of plate is hammered close over upon itself. This plate stood all the tests of the best Charcoal Iron, no Manganese was used in the Converting process.



of metal to the reservoir may be easily regulated. The several small streams from the reservoir will deliver an almost constant quantity of metal, varying only slightly as the operator regulates the head of metal in the reservoir—a means of regulating which a little experience would allow him to utilize with great advantage. From the smallness of the head of metal in the reservoir the several streams will fall quietly without splashing. These streams do not fall direct on to the rolls, but into a small pool formed between the thin films solidifying against the cold surface of the rolls, the metal at all times being free from floating slags.

The speed of the rolls also affords a means of regulating the quantity of metal retained between them; and as a pair of rolls would only require to make about four revolutions per minute, a quick running engine could easily be provided with differential speed gearing, so as instantly to alter the speed of the rolls to the very small

forward, and thus cool and stack a ton of plates without any labor or trouble.

The thickness of plates capable of being produced will much depend on the size of the rolls. If drums of 10 or 12 ft. in diameter are employed, it is probable that plates $\frac{3}{4}$ in. in thickness could be produced, or perhaps even thicker. The central space between drums of such large diameter would represent a sort of plate-ingot-mold with nearly parallel sides for some 8 on 10 in. in depth.

When producing sheets of steel, the initial thickness of which does not exceed 0.1 in., it might, at first sight, appear that the finished plate, with only two more rollings, would not get sufficient work done upon it to develop the same degree of toughness and cohesion that would be obtained by the many rollings which the present system necessarily involves. However, a little consideration will render apparent the entirely different conditions under which the formation of the plate takes place.

Mild cast steel is made up of crystalline bodies, and the size of the crystals depends on the bulk of the mass and the time allowed for their formation; the longer the time allowed, and the greater the mass, the larger are the crystals obtained; their planes of cleavage are also more clearly defined, and are more easily separated from each other, or, in fact, have a less amount of cohesion.

A cast ingot 1 ft. square, quietly reposing in a soaking pit or heating furnace, may go on crystallizing for 2 or 3 hr., and develop a coarse crystalline structure. But, in rolling fluid steel in the manner proposed, we have, in place of the 10-in. ingot, a sheet of one-hundredth of that thickness only, and in lieu of the two or three hours allowed in ordinary cases for the development of crystals, we have, when using a 4-ft. pair of rolls, making four revolutions per min., a transition from absolute fluidity to absolute solidity in just $\frac{1}{2}$ sec., in a mass only 0.1 in. in thickness. The time occupied by this transition then must be microscopic indeed, and possess but little, if any, of the properties that are developed in large masses during hours of repose in the soaking pits. Hence, it appear to me highly probable that the homogeneous fluid metal will pass at once into a perfectly homogeneous uncrystalline body, and being subjected to fluid, semi-fluid, and solid pressure in rapid succession, will develop the full cohesive force and toughness which the metal is susceptible of.

It will be at once perceived that in this mode of disposing of a ladleful of steel in the rolls we avoid the cost and the wear and tear of casting molds, and the labor of their removal and rearrangement at each casting operation, also the need for soaking pits or reheating furnaces, with their accompanying cost of labor and fuel. There will, moreover, be no loss arising from the waste ends of piped ingots, etc.

It will be understood that thin sheets so produced will not acquire any scale during the single minute they are exposed to the oxidizing influence of the atmosphere prior to their immersion in the water-tank, and in consequence of there being no overlapping of plates in rolling there will be but little loss of metal in shearing.

With reference to speed of production, let us assume the mill to be fitted with a pair of 4-ft. diameter rolls, 18 in. wide, and making four revolutions

per min., and set to produce a sheet having an initial thickness of 0.1 in., and rolled by the third pair to 0.05 in., we should thus have a surface velocity of the first pair of rolls equal to 50 ft. per min., and making when finished 100 plates 18 x 12 in., 0.05 in. thick, and weighing 300 lb., or equal to a

production of 1 ton of plates in $7\frac{1}{2}$ min.

Hence it becomes a question which is the least costly mode of dealing with a ladleful of fluid steel?—forming it into massive ingots in molds, or making it into thin sheets in the manner proposed?

Notes On Experiments In Rolling Fluid Steel

DIARY OF EDWIN NORTON

o o o

Edwin Norton was vice-president of the firm of Norton Brothers, manufacturers of tinning machinery for tin plate, and later helped form and was first president of American Can Co. His nephew, R. H. Norton, is now president of Acme Steel Co. This diary refers to experiments of the Fluid Metal Rolling Co., Maywood, Ill., in which about \$250,000 was spent by Edwin Norton and John Hodgson.

o o o

1st Rolling, March 25, 1891

This, the first attempt at rolling steel taken direct from the open hearth furnace, was tried with an ordinary type of ladle for pouring steel castings, having the usual type of stopper and nozzle, the latter only $\frac{1}{2}$ in. in diameter. So small a stream failed to distribute over the rolls so that a continuous sheet was impossible. The small scraps of steel filled and clogged the conveyors necessitating stoppage. The stream of steel directed upon one spot on the rolls induced unusual expansion, aided probably by the construction of the rolls which were cast with a central rib inside which probably shrunk from the body of the rolls in casting. As a result the surface of both rolls was cracked. The inability to accurately control the flow of steel through a nozzle was clearly a serious disadvantage, and it was evident that a tilting ladle was the proper apparatus for this purpose.

4th Rolling, May 19

Weight of charge, speed of rolls and gage remained the same. On tapping the steel from the furnace into the ladle, the stopper leaked a little and froze so that it had to be broken out, leaving a small and bad hole. Meanwhile the ladle had been partially tipped and the steel came out with a gush when the stopper was broken away, filling the trough full. This froze making further pouring impos-

sible. A sheet 15-20 ft. long the full width of the rolls was obtained. The surface was blistered as heretofore but the sheet was otherwise good. The blisters are evidently due to occluded gases and in the next heat deoxidizers will be used to try and overcome this.

5th Rolling, May 20

In this heat both ferrosilicon and ferroaluminum were used in addition to the ferromanganese to try and obviate the blisters. The steel however proved very "lively." The heat was nearly one-third poured when the steel gradually filled and froze around the nose of the pouring trough, eventually freezing solid clear across the rolls and stopping the engine. A sheet 100 ft. long averaging about 26 in. wide was obtained, but with blistered surfaces due to the "lively" steel.

Maywood, Dec. 28, 1891

We had trouble in getting the steel made in the open hearth furnace without too much slag which would gather on top of the steel in the ladle and in spite of the slag bridge used some of it in pouring would get in with the steel, and of course would make a hole in the sheet. Then, also, we had great difficulty in regulating the pouring of the steel, so as to properly fill across the rolls. The man who would turn the crank of the crab or gearing used to tilt the pouring ladle would either turn too fast, and flood the mill (stalling the engine), or he would pour

too slow and break the flow of metal and thus make short sheets (not continuous). We made several tests of the new mill (8 ft. in diameter) however, and succeeded in making several tons of quite good sheets, being ductile and on the side next the sand floor (where we deposited them from the end of conveyor) free from scale, but not for the top side where exposed to the air. Scale would form in cooling as we had no finishing mills for rolling these sheet bars into thin sheet iron (they being from $\frac{1}{8}$ in. to $\frac{3}{16}$ in. thick). We obtained a shear and sheared them up into what is known as "sheet bars," and shipped some hundred of pounds to Somers Brothers of Brooklyn, N. Y., to be rolled out into black plate. We first sent them a small piece to roll about 6 in. square, and $\frac{1}{8}$ in. thick. This being rolled into eight sheets 6 in. square and of thin tin plate gage, and of fine quality and texture. They were afterward annealed, pickled, cold rolled and some of them tinned by Somers Brothers, and other lots tinned by us at Maywood. The ductility of the steel was all that could be asked—what defects there were were caused by the slag getting into the sheet of steel. The scale formed by the oxidation of the sheet in cooling after having been rolled. In addition to having these bars rolled into black plate, we sent a number of them, $\frac{3}{16}$ in. thick and about 24 in. wide, to Apollo Iron & Steel Co., Apollo, Pa., to be rolled into sheet iron. This was done by them at about the same time as the Somers Brothers lot was rolled. Apollo sent back to us the steel rolled into sheets 24 in. wide and about 6 ft. long and No. 26 gage. Some of the sheets were galvanized and some were black.

The money originally paid to conduct the experiments having been exhausted and Norton Brothers having carried the work along as far as they felt able, being badly upset by a fire which destroyed our River Street, Chicago, works, making it necessary to rebuild at Maywood and the necessity of giving our undivided attention to the regaining of our trade which had been somewhat interfered with, by our fire, we were obliged to suspend further work (as we hoped temporarily). But, the panic of '93 following closely upon our other troubles, and we did not feel either that we could afford at the time to spend any more of our means in the work of experimenting—nor that we had yet reached a satisfactory enough result to be able to say definitely we could overcome the

mechanical difficulties in the way of commercial success, so as to be justified in offering more of the stock for sale, to obtain funds to carry the work to conclusion.

The results obtained with the 8-ft. rolls at slow speed were such that we feel sure we have struck the right principle, and that the speed of the rolls must be still further reduced to say $1\frac{1}{2}$ revolutions per min. This being done and arrangements made to pour the metal automatically at the surface speed of the travel of the rolls, and so that in case of any variation in the latter the former will also be changed in same relation, we shall be able to make a continuous primary sheet bar in indefinite continuous lengths.

To avoid the trouble from the cooling of the sheets causing scale, we decided that it would be necessary to utilize the heat of the primary sheet by passing it through a series of chilled and polished finishing rolls. At the World's Columbian Exposition a long sheet of steel had been placed on exhibition, which had been made at the Rudolph Shuette Works at Teplitz, Bohemia, upon a continuous train of rolls (from $\frac{3}{8}$ -in. bar)—the technical descriptions of the Teplitz mill were very similar to the plan we had been considering for this purpose. We concluded it would be wise to go to Teplitz and attempt to see this mill in operation and learn if it was practicable, rather than spend a lot of money in experimenting on the new problem, as yet untried, or at least unsuccessful in America. Accordingly after the close of the World's Fair, E. Norton and J. G. Hodgson took a journey to Teplitz, in the mountains of Bohemia, to see the new continuous mill. We had great difficulty in gaining admission to the works and would have had our journey for nothing had we not happened to have with us photographs showing our fluid mill rolling out a wide thin sheet, which photograph was taken by Mr. E. Norton during the operation of the mill. This photograph we have since had engraved to preserve the view for future use. We found this mill was a great success. [This Teplitz sheet-width continuous mill, as well as two built by U. S. Steel Corp. in 1904, were unsuccessful and ultimately dismantled.—Ed.]. Its principal advantage being the manufacture of a finished wide thin sheet bar 28 in. to 32 in. wide and 150 ft. to 160 ft. long and $\frac{1}{12}$ in. thick, absolutely free from scale (a thing unknown to this coun-

try); and when sheared into length for hot rolling in tin and sheet mills, it was operated on by at once matching and rolling in pairs, thus doing away with the labor of "breaking down" and the very severe shocks upon the mills used for that purpose. We also found that the perfection of these bars made a great reduction in the quantity of "wasters" made in making tin plate. We were shown every attention by the management, as we took samples of our sheet iron, galvanized iron and black plate for their inspection, and we went from the mill at Teplitz to Vienna, the home of Mr. Carl Wittgenstein, the owner of the works, and the man who had at great expense perfected it.

We talked over with him our proposition to unite our fluid mill with his finishing mill, and arranged with him for a license under his own patents (should he secure same) and on our return made working drawings of a complete mill including the automatic pouring device; and, in order to prove our drawings, we made a scale model of the complete plant, which model we now have. We have decided that for the purpose of further experimenting we will use a small Bessemer converter and utilize our cupola for melting the iron and convert about 1500-2000 lb. at a blow. (A number of these small plants being obtainable cheap, second-hand, we can select the best.) To avoid the trouble we have had from the start with "slag," we will tap out into an ordinary Bessemer ladle (we have one), allow the slag to rise to top and solidify, then open the plug and draw the clean steel into our pitcher spout pouring ladle, and thus avoid the slag. This mill also reduces the temperature somewhat, and thus facilitates the rolling.

Large rolls not less than 8 ft. in diameter, slow speed not over $1\frac{1}{2}$ revolutions per minute. Rolls 8 ft. in diameter for metal about $\frac{1}{8}$ in. thick; rolls 12 ft. in diameter for metal $\frac{3}{16}$ to $\frac{4}{16}$ in. thick; and larger in same proportion are about right.

Regular pouring, automatically regulated so that at all times the flow of metal is equal to the surface speed of the travel of the rolls, will insure good sound continuous sheets from fluid steel, providing the slag is kept out of the sheet as stated above. These are the conditions required for success, and with them success is certain. It has been a long road to these conclusions, but they cannot be upset.

(signed) *Edwin Norton*
Dec. 28, 1892

◆ ◆ ◆ NEW DEVELOPMENTS

By DON R. JAMES
Cleveland Editor, *The Iron Age*

○ ○ ○

HOW to classify divergent opinions of users of atmospheres, and where convection gases stand in comparison to baking by radiation, were two outstanding topics at the fifth A.G.A. conference on industrial gas sales, held in Toledo, Ohio, March 28 and 29.

The annual session, which this year attracted more new faces and had wider geographical scope than ever before, also heard about possibilities of gas as a chemical as well as a fuel; new developments in open flame heating; merchandising gas air conditioning, and new sales promotional possibilities. As still another feature, the viewpoint of the industrial gas customer was presented in an address by a customer.

Declaring the atmosphere field somewhat disjointed because of the different types operating under the same conditions on identical steel, with each user claiming the best results, a panel discussion led by Clayton S. Cronkright, Newark, N. J., chairman of the metal treating and melting committee, sought to discover whether the time is ripe for decisions which can guide users. It was the consensus of the group after considerable thought that published basic information to give users a background on atmospheres would be exceedingly helpful.

The human element is often a factor causing variance and trouble in the atmosphere problem, pointed out Henry Heyn, Surface Combustion Corp. Another angle, brought out by Frederic O. Hess, The Selas Co., Philadelphia, is the time factor, with the same atmosphere giving different results on different cycles.

Classifying bright annealing jobs over the nation as to the limits attained, would be of great value to the sales engineer and user, others said. Whether the gathering of the data is done by detailed questionnaire or some other method, it was agreed the step should be undertaken immediately.

Both radiation and convection have



(Left to right)—Frederic O. Hess, President, the Selas Co., Philadelphia; Hale A. Clark, Industrial Engineer, Michigan Consolidated Gas Co., Detroit; Don A. Jacobson, Burdett Mfg. Co., Chicago; ring-leaders of the Clinic on Near-Infra-Red Ray Heating at the 1940 A.G.A. Industrial Gas Sales Conference, Toledo, March 28 and 29. Mr. Jacobson holds a ceramic radiant-heat gas burner and Mr. Clark a sample of pressed ware bake-enamelled by radiant gas heat in the infra-red zone.

definite places, according to opinions voiced at an interesting clinic session devoted to baking methods, led by Hale A. Clark, Michigan Consolidated Gas Co., with Mr. Hess of the Selas Co., and Don A. Jacobson, Burdett Mfg. Co., Chicago, as the principal speakers.

The gas industry has a very good medium in convection alone, said Mr. Hess, and whether radiant heat can be added is being investigated now.

"With convection we have no effect of different colors, and no effect of varied distances," he continued. "We merely have a problem of temperature and we can cure the finish without bringing the metal up to a very high temperature. We can group articles without fear of shadows and we can have shorter ovens. Variations in thickness of the metal are handled without any loss of time."

Mr. Jacobson asserted that "our burners have a very definite place on heavy objects and where odd corners, wrinkled or shaded spots are involved,

and the jobs can be done at four to seven feet distance."

The respective efficiency of various methods of heat transfer, and other background information was supplied by Hale Clark, who pointed out that it is difficult to find exact comparisons between gas fired ovens and infra-red installations carrying identical amounts of work. Another important point, he said, is the differences in types of enamels being used. Attempts to shorten the time of the bake may increase the cost of the coating material or the resultant finish may be less durable, he added.

"Chemical processing offers a fertile field for gas sales, asserted C. George Segeler, engineer of utilization, A.G.A., New York, in an address titled, "Heat and Chemical Raw Material." With the inclusion of gas used for making carbon black, the total volume of gas used in chemical processing per year is almost equal to the total sales of natural gas for domestic purposes.

COVERED IN GAS CLINIC

The speaker classified chemical applications into four main groups, as follows:

(1) Direct interaction between gases and various chemical reagents to form new products.

(2) Cracking of saturated gases to form unsaturated compounds which can then be converted into other chemical products. Cracking may also be applied for producing heat treating atmospheres high in hydrogen and carbon monoxide.

(3) Partial combustion to produce the many different types of heat treating atmospheres for bright annealing, hardening, brazing, malleableizing and carburizing. The speaker outlined nine methods of producing these atmospheres.

(4) Complete combustion to produce "inert" atmospheres containing large amounts of carbon dioxide and no oxygen. Sometimes a little carbon monoxide is desired.

Touching upon efforts hitherto unsuccessful commercially in the reduction of various ores, Mr. Segeler

Furnace atmospheres, continuous annealing, flash baking methods, fabricating operations, etc., all covered in two-day conference.

pointed out that a natural gas reduction process had turned a pile of pyrite cinders into sponge iron which was later converted into useful rods and sheets, and that natural gas can be converted to producer gas which is then used to make zinc.

"Another mining idea deserves mention," he continued. "Germany just misses having a monopoly on potash. We have various smaller deposits, and a considerable amount of mixed material known as polyhalite. This can be reduced with gas to permit separation of potash, magnesium and calcium salts. It is not being carried out commercially."

Carbon breakdown causes some difficulty in the continuous strand annealing of brass wire in atmosphere of natural gas, Mr. Segeler said, but results at Buffalo are termed satisfactory. Reduction of tungsten metal powder at 3200 deg. F. is being carried out at York, Pa., through application of unburned gases.

Chemical applications of flue products (complete combustion) as listed by the speaker include: lithographing tin containers at Rockford, Ill., with direct gas heat, bringing out the light colors with superiority; using flue gas from boilers to precipitate magnesium

(CONTINUED ON PAGE 96)

CLAYTON S. CRONKRIGHT, Industrial Fuel Representative, Public Service Electric & Gas Co., Newark, (puffing cigar), Chairman, A.G.A. Metal Treating and Melting Committee, leads a round-table discussion among 40 industrial gas leaders from coast-to-coast, on trends in fueling in the metal field—Don R. James, THE IRON AGE, may be seen center top.



WHAT'S NEW IN MACHINE TOOLS

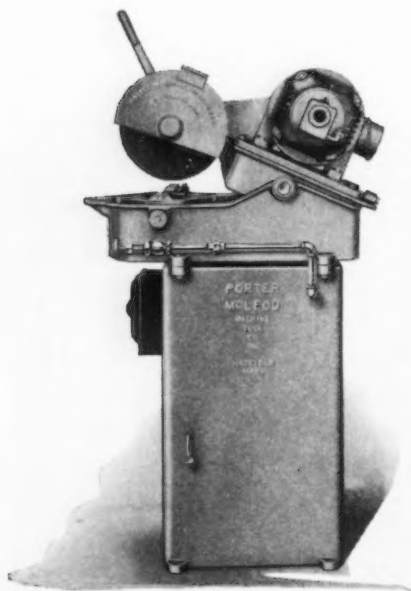
By FRANK J. OLIVER

Associate Editor, *The Iron Age*

FROM abrasive cut-off machines to screw machines, new developments continue apace in machine tools. This condensed review of the main features of recent models is

based on announcements made by the builders during the past two months. The trend toward sturdier design and more rigid structures is continued in many models.

TWO new types of abrasive cut-off machines have recently been placed on the market. Both are driven by V-belts from the pivoted motor. The unit made by the *Porter-McLeod Machine Tool Co.*, Hatfield, Mass., comes in both a bench and a pedestal type, of identical construction

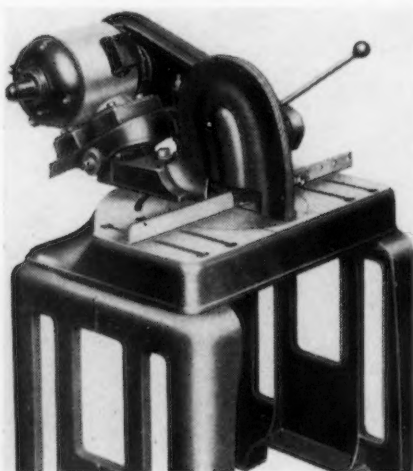


except for the addition of a cast iron pedestal base, the lower part of which forms a coolant tank. All castings of the unit proper are of aluminum with the exception of the fulcrum shaft, which is of hard drawn bronze. There is also a bronze insert in the table top for resisting wear and a bronze work support. The swing frame is carried

on a two-bearing fulcrum shaft in a balanced position. Wheel spindle is mounted on Timken bearings, with lubricant sealed in.

Wheel diameter is 12 in. maximum and capacity is for work 1 in. in diameter. An adjustable stop gage takes lengths up to 12 in., and a graduated turntable permits miter cutting up to 45 deg. in either direction in 5 deg. steps. Water or coolant is led into a box located under the turntable and thence through an opening from which it pours over the work.

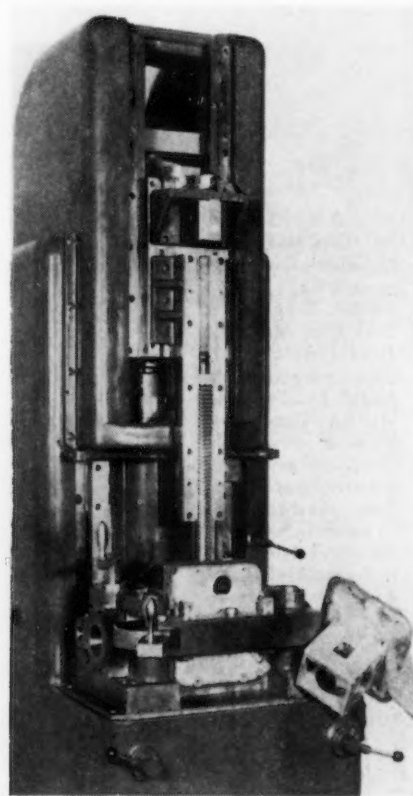
THE second abrasive cut-off machine illustrated has been developed by the *Delta Mfg. Co.*, Milwaukee, for cutting all kinds of material dry. By switching to a saw blade, this same unit can be used for cutting wood. With capacity for work up to 2 in. diameter or material up to



2 x 6 in., the machine features wide spread Timken roller pivot bearings and double arbor sealed bearings, rotary table for cutting work at various angles, chip guard and fence.

Broaching Rectangular Holes

ONE of the difficulties of broaching a rectangular opening out of a round hole is guiding the broach. In the *Colonial* machine shown below, the



broach is round at the small end and has four flats leading up to the large end, which is rectangular. On two sides of the broach, a vertical groove is machined into the flat faces part way down and these grooves register with guides in the broach handling mechanism of the machine. By holding the broach in this manner, deflection is minimized and broach life is materially increased. A standard pull-down broaching machine is used, equipped with automatic broach puller and broach handling mechanism.

Gear Shaving Machine

A HEAVY C-type, one piece frame is used to give solid support to the cutter head and to the lead screw under the knee in the new extra heavy duty Red Ring gear shaving machine, announced by the *National Broach & Machine Co.*, Detroit. The knee is supported on a 2½-in. diameter feed screw, providing maximum rigidity. The cutter head has solid support on



both sides of the cutter. Work table is heavy box construction. Overall rigidity is such that cuts of 0.002 in. can be taken over pins, representing metal removal of approximately 0.0003 in. on a tooth side. The spindle is 2½ in. in diameter.

As in other Red Ring shavers, this one makes use of a gashed helical gear form tool in mesh with the work gear, with the axes of the two crossed at an angle of 10 to 15 deg. The cutter gear drives the work gear as the latter is traversed back and forth across the cutter generating the profile within

0.0001 in. of that desired. Individual motor drives are used on cutter spindle, table and oil pump. Automatic feed box has been redesigned so that quick settings can be made, and automatic feed is cut in or out by a second lever. In fact, the entire cycling may be made automatic. Ample provision for coolant and chip disposal have been made.

Belt Grinder

A NEW heavy duty belt grinder equipped for wet or dry grinding, designated as type G8, has been added to the line of the *Porter-Cable Machine Co.*, Syracuse, N. Y. It has provisions for a variety of speeds from 2400 to 6000 ft. per min. for grinding metals, plastics, ceramics, etc. Special



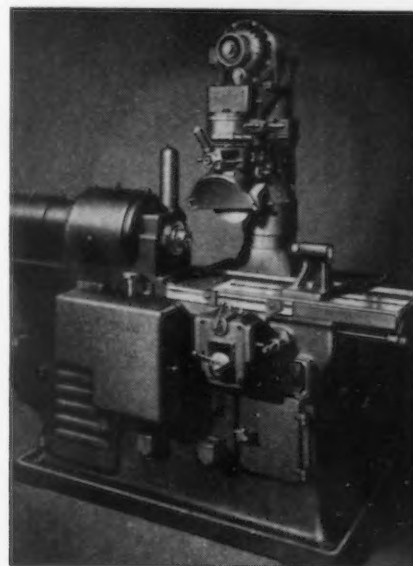
cloth belts are supplied in a variety of grits for the desired finish or for the time allowable for the job. When grinding wet, the grit is kept clean and free to cut and the belts last longer. For a given grain size, a finer finish is obtained when grinding wet as against grinding dry.

An exceptionally long belt is used, 9 ft. in circumference, reducing heat and giving longer service. The width is either 8 or 9 in. The machine itself is built for heavy duty service, with large pulleys and heavy, sealed bearings. The table is 11¾ x 8 in. with slot for angle gage, and the adjustable belt backing plate is 9 in. wide by 19 in. high. Drive of the belt is from either a 3 or 5-hp. motor.

Hob Sharpening Machine

PRECISION automatic regrinding of hobs and formed milling cutters in sizes up to 10 in. diameter and 12

in. face is possible with the new No. 4 automatic hob sharpening machine added to the line of the *Barber-Colman Co.*, Rockford, Ill. An outstanding feature is the hydraulic table drive in place of the barrel cam used on previous machines. Adjustable feed of traverse offers advantages in hob sharpening work. Hob life can be materially increased by giving the faces of the teeth a finer finish, accomplished by slowing down the table



speed on the last circuit of indexing. Production is also facilitated by giving the operator entire flexibility of control of table speed to suit requirements.

The table carries the work between centers and reciprocates to pass the tooth faces across the fixed position grinding wheel, carried with its driving motor on a vertical upright. This table also contains an automatic mechanism for indexing the work from gash to gash. There are change gears in the drive mechanism to permit alterations in the speed commensurate with the size and length of the work and the time in the cycle available for indexing. After a complete circuit of indexing, there is a feed control which advances the work so that further metal can be removed from the tooth faces on the next circuit.

The motor spindle is set at an angle to bring the rear convex cutting face of the wheel in a vertical position where it meets the work. The entire wheelhead can be raised or lowered, and the wheel spindle can be run back as the wheel is redressed. For helical work, the wheel can be swung about a vertical line through the work center up to 30 deg. either side.

Grinder Accessory

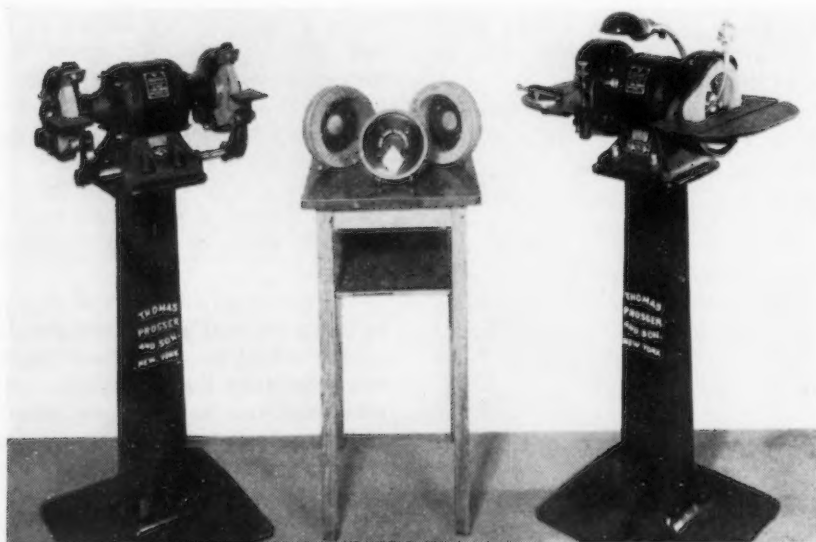
WHERE the requirements of the work call for a chuck, spring collet or driving center and when the full table capacity is not needed, *Brown & Sharpe Mfg. Co.*, Providence, is offering the revolving spindle headstock equipment shown for use on its Nos. 20, 22 and 23 plain grinding



machines. Spindle is mounted on sealed preloaded precision ball bearings and is driven directly by the work driving plate of the regular headstock. Front end of the spindle attachment is threaded and has a No. 11 B & S taper hole, with a through hole 1 1/6 in. in diameter.

Carbide Grinding Set

A CARBIDE tool grinding set is being offered by *Thomas Prosser & Son*, 120 Wall St., New York. Machine at the left is for the rough grinding of shanks and for rapidly roughing



out chipped carbide material. Work rests are provided for grinding on the periphery of the wheels. In the machine on the right, a comparatively small amount of grinding is then done on the surface of the silicon carbide cup wheel, with a final touching up on the finishing wheel—either silicon carbide or diamond. The pivot points of the tables are in the same plane as the face of the wheel to facilitate quick adjustment to the desired angle. Motors are reversible so that either right or left hand tools can be ground. Provision is made for supplying the diamond wheel with either oil or water.

Grinder Dust Collector

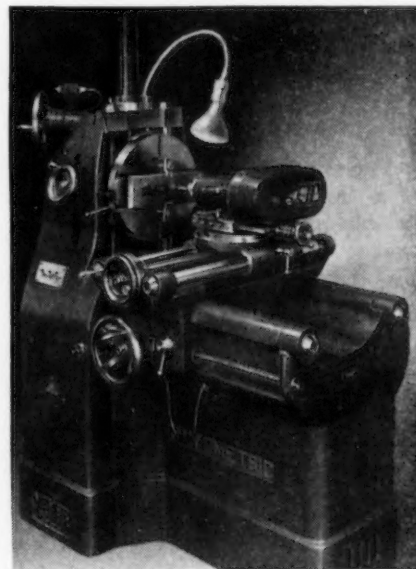
IN the Torit dust collector, dust laden air from polishing and grinding wheels is drawn from the hoods into the base of the unit and up through a series of chemically treated, spark resistant cloth filter bags. The filtered air passes through the motor



chamber above the filter bags and then out an exhaust vent. These units are furnished by the *Torit Mfg. Co.*, 277 Walnut St., St. Paul, Minn., in three capacities from 150 to 600 cu.ft. per min. for wheels up to 16-in. diameter.

Jig Borer

LOCATING, layout, boring and inspection are combined in a single function in the Autometric jig borer, produced by the *Meyer Mechanical Laboratory*, 1811 Sacramento Street, San Francisco, and only recently introduced east of the Rockies through dealer channels. Work is mounted on



a vertical rotary table, with power drive for boring, hand rotation for setting up, inspecting and arc milling. Measuring is done with the use of built-in mechanical counters and precision screws, controlled by 6-in. micrometer dials, reading by vernier to 0.0001 in. These screws are ground, seasoned, finish ground and lapped. Maximum lead error between any two points on the 16 in. cross measuring screws is said to be 0.00025 in. and on the 10 in. vertical screw, 0.0002 in.

Ways are round shafts hardened to 62-63 Rockwell C, and on these shafts ride lapped steel bushings frozen into their housings at -90 deg. F. The holes for the ways in the body of the machine, the carriage, the compound and the vertical table rotary table head are reproduced from aligned bore fixtures. The boring spindle is carried on SKF precision double-row cylindrical roller bearings, designed to minimize deflection under load. Spindle speeds range from 294 to 2350 r.p.m. There are separate motor drives for the rotary table, the boring spindle and the feed. Boring of large holes is done with the spindle locked and the table driven at 30 to 437 r.p.m.

Inspection is done from a surface plate, independently of the boring spindle. This plate rests on the bar

ways through Vs. Layout work is also done from the surface plate. Besides the model A machine pictured, there is a model B machine having a 12 x 18 in. rectangular table with three T-slots, without the rotary motion.

Marking Machine

BY applying marking pressure through an air cylinder, even though the work diameter may vary by as much as 1/64 in., inscriptions are marked to a uniform depth in this No. 98 rapid precision marking machine, recently built by the *Noble & Westbrook Mfg. Co.*, 20 Westbrook St., East Hartford, Conn. This particular unit was designed for marking cylindrical products that can be placed on end, such as bushings, socket

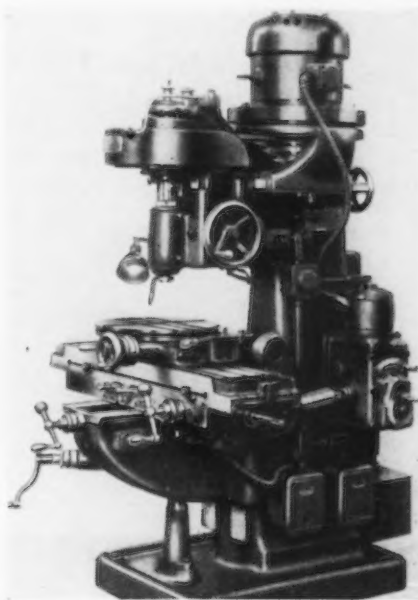


wrenches, spark plug shells, small explosive shells and similar articles. Both the pressure dial and the dial

holder have vertical adjustment so that the inscription can be marked on the piece up to approximately 1 1/4 in. from the end.

Vertical Miller

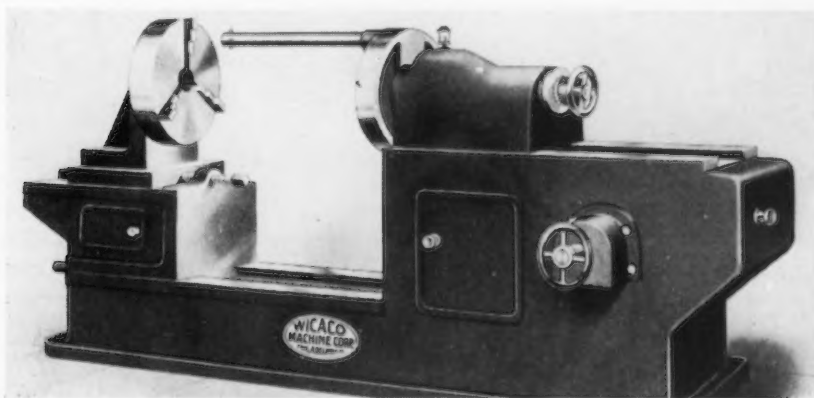
A No. 3VG model supersedes the No. 3V vertical milling and die sinking machine made by the *Reed-Prentice Corp.*, Worcester, Mass. New features include a back gear spindle construction mounted in an auxiliary



bracket at the top of the spindle. With the back gear engaged, spindle speeds are one-third the corresponding standard spindle speed. The new 3V collet similar to that used on the No. 2V router and miller is available for this machine.

Large Size Oil Groover

EITHER internal or external oil grooving of bushings or irregular shaped machine members may be

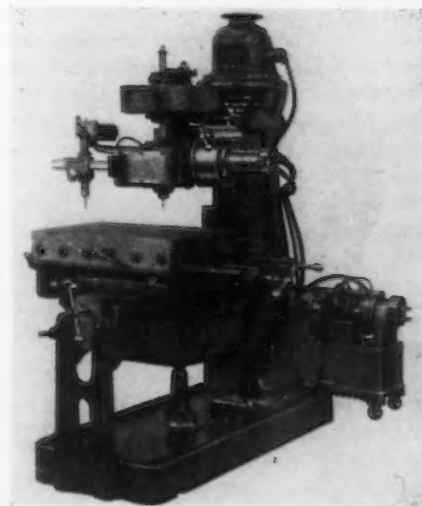


accomplished automatically in a heavy duty horizontal type machine developed by the *Wicaco Machine Corp.*, Stenton Avenue and Loudon Street, Philadelphia. The capacity and speed of the unit is much higher than on earlier Wicaco oil groovers. The work is held in a non-revolving chuck, and by substituting special fixtures for the chuck, work of almost any shape can be spiral grooved on a production basis.

The reciprocating and rotating tool speeds are both variable by means of independent change gears which will produce the desired lead or pitch of the groove. The feed or depth of cut is entirely automatic, can be preset for any reasonable amount of stock removal per cut. Through a special relieving attachment, the tool can be pulled away from the work at any point on the circumference being cut. The speed of the cam controlling this motion can be varied through change gears so that one cam is applicable to most types of relieved oil grooves. It is also possible to cut straight grooves or keyways with the machine. All parts are accessible and all change gears are confined to one end. The entire machine is automatically lubricated.

Hydraulic Duplicating Control

GREATER accuracy and faster production in the duplicating of dies, molds, etc., from patterns are said to be among important features



of a new low cost duplicating control and drive mechanism announced by *Detroit Universal Duplicator Co.*, 233 St. Aubin Street, Detroit. With the new design, the duplicator can be used

to actuate either the table feed or the head feed of vertical milling machines, the latter method supplying the highest degree of accuracy. The unit also is applicable to a wide variety of machine tools such as lathes, shapers, planers and boring mills.

The new drive consists of a hydraulic motor mounted on the milling machine head to which is connected the down feed. The electrical control system governing impulses to the feed drive provides high speed super-imposed impulse interruptions so that feed control is broken down into minute steps, permitting working to within 0.0015 in. on most types of work. As the tracer follows the pattern, a series of electrical contacts is made, each immediately broken by a cam operated contact point. Each time contact is made one of two solenoids is actuated, controlling the up or down position of a hydraulic valve plunger. Fluid is thereby diverted into either of two flexible hydraulic supply lines connected with the hydraulic feed motor.

Plunge Miller for Long Work

MILLING of Woodruff keyways in line along long shafts and other intermittent operations on structural shafts and lengthy pieces can be performed with a new milling machine built by *Kent-Owens Machine Co.*, Toledo, with an extra long table to provide adequate support for the work throughout its entire length. In the illustration, the shaft rests in V-blocks and is clamped in place against a stop. The table is advanced lengthwise through a rack and pinion by means of a handwheel. Dogs are used to position the work for each successive keyway.

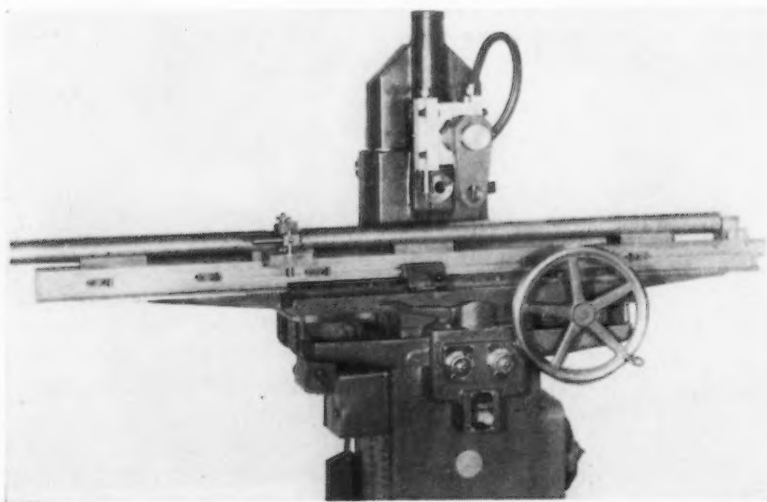
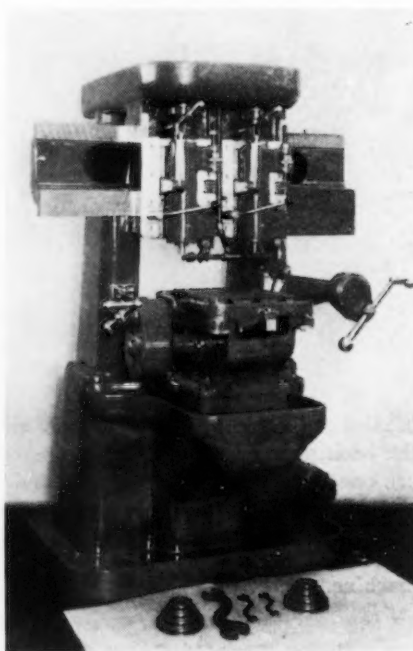
After the work has been set, the ver-

tical movement of the head is entirely automatic. This movement is obtained hydraulically and adjustable dogs permit any combination of rapid traverse and feed within given limits. Spindle speeds are varied through a pair of pick-off gears.

In the set-up illustrated below, a spring backed clamp is shown mounted on the overarm. It contacts the work shortly before the actual milling begins so that the work is securely held near the point of milling throughout the operation.

Vertical Profile Miller

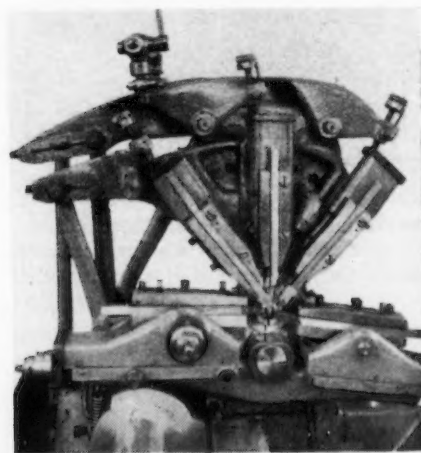
THE No. 12M high speed vertical profiler and milling machine pictured below has recently been introduced by the *New York Tool Co.*,



Inc. The two spindle model is standard. Cross rail is fixed in height and the slide castings carrying the spindles and the motors are in balance. Between the base and the table housings there is a removable filler block so that the maximum distance between spindle nose and table may be varied without changing the height position of the spindle operating levers. Spindles are driven independently through V-belt and are equipped with precision, preloaded anti-friction bearings for operation up to 2000 r.p.m. The copying pins are carried in blocks which have a taper attachment controlled by a screw. Vertical setting of spindles is by dials to 0.001 in. The unit is sold through the *Morey Machinery Co., Inc.*, 410 Broome St., New York.

Swiss Screw Machine

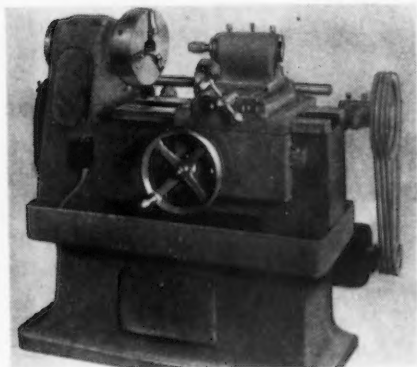
A NUMBER of improvements have been made in the Petermann screw machines, made in Switzerland and sold in the United States through *Russell, Holbrook & Henderson, Inc.*, 99 Hudson St., New York. Work is fed through either a stationary or revolving bush in the headstock, and the five slide tools are grouped radially very close to their supports, resulting in high diametrical accuracy. These tools are adjustable micromatically in three directions and are rigidly mounted. By means of pick-off gears, 17 changes of spindle speed are avail-



able and 58 speeds of the camshaft are provided for each spindle speed. The standard machine of the model P7 size (0.280-in. capacity) has a spindle range of 1800 to 10,000 r.p.m. Threading is performed by overrunning, that is, driving the tap or die in the same direction as the spindle but faster.

Hob Thread Milling Machine

LAATEST type hob thread milling machine manufactured by the *James Coulter Machine Co.*, Bridgeport, Conn., is the type H semi-automatic illustrated. Work is supported by universal chuck, master collet chuck or special fixture attached to the flanged end of the hollow spindle.



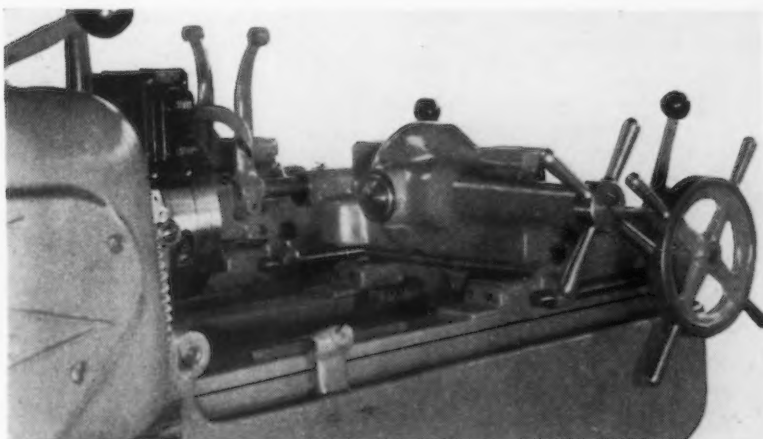
During the cutting cycle, the work spindle is revolved $11/5$ turns after the hob has been moved to exact depth automatically after having been brought up to a stop manually. When the work spindle stops, the hob withdraws and the machine stops ready for the repeat cycle.

The standard machine is equipped with two motors, one for the work spindle, the other for the hob spindle, and is ordinarily provided with a 12-in. three jaw scroll chuck. The milling spindle has taper bearings with take-up adjustment and is driven by worm and gear. Variations in speeds and feeds for various diameters to be milled are obtained through pick-off gears. Maximum external thread is 7 in.; internal, 6 in. The minimum internal thread

diameter depends upon the hob diameter. Hole in the spindle is 4 in. The machine will swing work 14 in. in diameter over the carriage.

Pipe Coupling Chamfering Machine

A NEW double end chamfering machine, illustrated, for working both ends of pipe couplings simultaneously, and incorporating many novel features, is offered by the *Acme Machinery Co.*, 4535 St. Clair Avenue, Cleveland. Cutting tools are driven in opposing spindles mounted in a four-speed geared headstock and may be adjusted while machine is running. Shafts are mounted on anti-friction



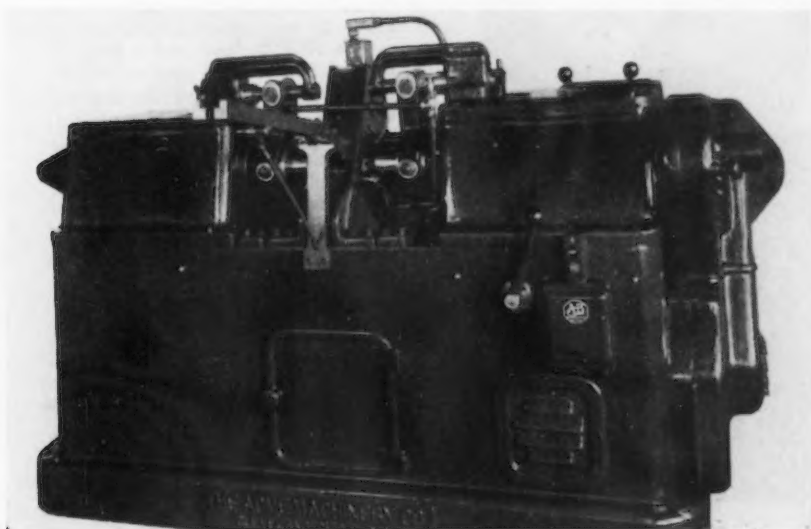
bearings. The couplings are held in air-operated, self-centering chucking jaws, couplings being fed to chucks from magazine-type runways. Limit switches are used as an added safety

factor. Machine is controlled by multiple disk friction clutch driven by Texrope drive and a $7\frac{1}{2}$ -hp. motor in base.

The working cycle of this machine consists of coupling rolling into place in chucking jaws, with cutting tools moving in simultaneously, fed by cams, and chamfering of coupling. As cutting tools recede, the finished coupling is released, rolls from chuck and another rolls into place in the chucking jaws. This cycle can be varied through cam shaft gears. This machine can also be adapted to perform such operations as double end threading, hollow milling and drilling of such parts as rods, spindles or bushings.

Threading Machine Developments

A COLLET chuck carriage front for either its Landmaco or Landis standard threading machines is announced by the *Landis Machine Co.*, Waynesboro, Pa. The collet holding device is similar to the type employed in automatic screw machines and is actuated by a handwheel occupying about the same position as the handwheel of the standard carriage front. Separate collets are used for each diameter of work, and they can readily be interchanged. The manufacturer points out the following advantages of these collet chucks: first, the assured production of concentric threads, for the work is rigidly held in alignment with the die head; and, second, the elimination of gripper markings on the work. Long pieces may extend entirely through the collet, a work stop may be employed to position the work with relation to the die head, and very short pieces of work may be positioned by an adjustable work stop located within the bore of the collet.



THIS WEEK ON THE

By W. F. SHERMAN
Detroit Editor

ASSEMBLY LINE

... Step-up in production may be required to meet sensational spring demand for cars ... Field stocks already decreasing ... Graham resumes building automobiles ... Industrial buying level unchanged through February and March.

DETROIT—March retail sales volume large enough to indicate possibility of increases in production schedules has been reported throughout the industry. Spurred by

warmer weather in many sections of the country, retail sales in some cases were reported increasing faster than in any previous year. Correspondingly, field stocks of new cars started to de-

crease with extreme rapidity. It was this latter factor which led to conclusions in Detroit last week that some assembly lines might be stepped up or schedules for the year materially lengthened.

Sales reported by Ford Motor Co. in March ran well over 5000 per day in the booming last 10 days of the month. Ford-Mercury inventories actually decreased slightly during the month, with retail deliveries totaling 92,227 units and production estimated at only 88,500. The sales level was the



THESE are the first pictures of tests made on Dodge trucks for the U. S. Army which has recently concluded contracts with Chrysler Corp. for 10,786 trucks in six major body types. Top is the 1½-ton truck designed particularly for carrying cargo. The smaller one at the left, below, has a special body designed by the Army for reconnaissance work. These vehicles have four-wheel drive, must be able to go up a 50 per cent grade with a full load and maintain a top speed of 45 miles per hr. on the level. Tests are made with full loads. The light ½-ton truck must negotiate the 60 per cent grade in low gear with a 1000 lb. load, go up a 7 per cent grade in high gear with the same load, and a 5 per cent grade in high gear with the same load, plus a towing load of another 1000 lb. Heavy 1½-ton trucks must be able to go up the 60 per cent grade in low gear with a 3000 lb. load, a 5 per cent grade in high gear with a 3000 lb. load and a 3.5 per cent grade in high gear with a 3000 lb. load and a 4000 lb. towed load. The truck jumping the embankment is performing the required test of being run up a steep six foot incline without losing speed. The special reconnaissance type body has a collapsible top, no doors, heavy protecting screen in front of radiator and headlamps, channel iron bumper and carries a spare tire on the left running board. This photograph shows the four-wheel drive mechanism in silhouette underneath the chassis. The front wheel drive can be cut out when desired. Wheelbase for the large truck is 133 in. and for the small truck is 116 in. Some of the large trucks will have a specially designed winch, mounted in front of the engine.



"Only 34 Seconds
WITH A
MULT-AU-MATIC"

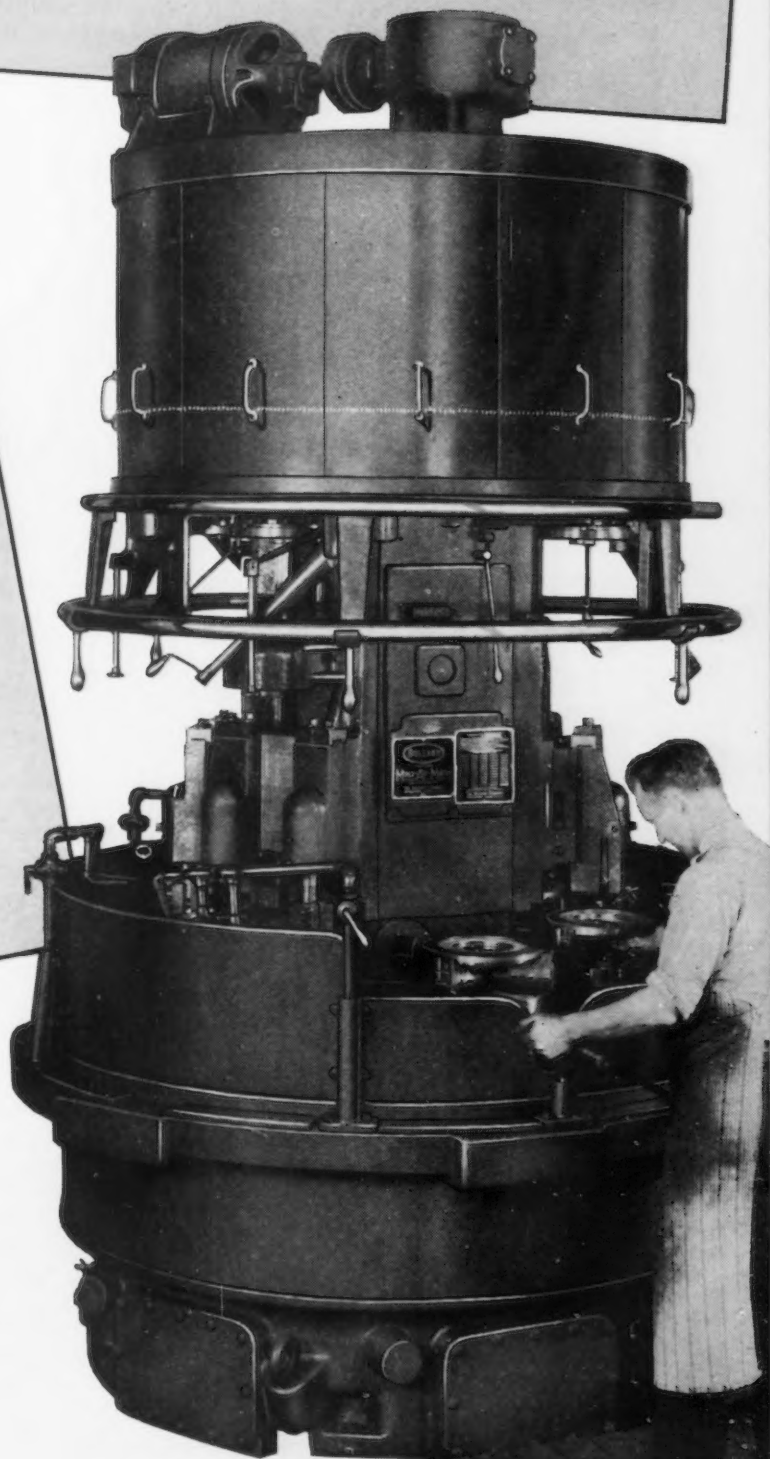
THE JOB...

Machining an adapter which involved eleven operations, including rough and finish turning, rough and finish boring, rough and finish facing and chamfering.

THE SOLUTION...

An 8" 6 spindle type D Mult-Au-Matic, tooled according to the layout supplied by Bullard engineers.

● This manufacturer bought a Mult-Au-Matic because a Bullard Engineering Study showed him a lower manufacturing cost per piece on the Mult-Au-Matic than he was able to obtain by any other method. Submit your job, without obligation, for similar study.



THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT

BULLARD

highest since July, 1937, and was 56 per cent above February. Mercury sales for March were the highest since the car was introduced more than a year ago and were 50 per cent above February of this year.

Buick domestic deliveries for the month totaled 24,452, with 10,757 of the cars delivered in the last 10 days of the month. The gain over February was 35 per cent. First quarter sales now total 61,625, a gain of 31.8 per cent over the first quarter of last year. Pontiac not only gained 48 per cent over February deliveries in selling 21,710 cars in March, but also concluded the best first six months of any car model year in its history. Retail deliveries from Oct. 1 were 107,849, an increase of 50.5 per cent over the first half of the previous model year. D. U. Bathrick, sales manager, adds the significant note, "Since Jan. 1 our total unfilled orders have never been less than four times what they were last year at the same time."

Hudson sales gains have been so astounding that they are being quoted on a week-to-week basis. The last week of March was 29 per cent better than the previous week, which in

turn was 20 per cent over the mid-month figure.

Final registration figures for February, just available, establish the fact that the month's sales nearly topped the February record of 235,590 established in 1929. Total registrations were 224,625 units, a decline of only 13.68 per cent from the January total of 260,216. This percentage is regarded as a very slight mid-winter drop in the passenger car industry.

A schedule readjustment by Chevrolet nudged last week's assembly total downward slightly. According to Ward's Automotive Reports, total passenger car and truck assemblies were 101,655 compared with 103,370 in the previous week and 87,019 in the corresponding week of a year ago. The Chevrolet schedule dropped from 27,000 to 25,000, offsetting increases in other plants, such as Plymouth, which turned out 11,685 cars compared with 11,575 the previous week. The Ford-Mercury schedule was unchanged at 20,150. Lincoln-Zephyr showed its first decline from an eight-week level of 600 per week; 480 Zephyrs were produced.

The resumption of Graham produc-

tion—its first for the 1940 model year—came during the last week. The new "Hollywood" line of cars and the "Clipper" in a lower priced range than the Graham Senior are being produced. The new low priced line will be easily identified as a product of some of the Cord dies which passed from Cord to Hupmobile and are expected to do double duty for Hupp and Graham. The cars now being produced are expected to reach the market in May. Immediate goal is 100 cars a day, according to August Johnson, executive vice-president.

Little Change in Buying Trends

Buying trends in Detroit have undergone little change since the last available figures (IRON AGE, March 14). Hand-to-mouth buying during March continued to be the policy of 14 per cent of Detroit's industrial purchasers, according to the Purchasing Agents Association. There was a lessening of six-month buying from 8 per cent to 2 per cent, with slightly greater concentration in the 60- and 90-day range.

Despite denials which were made earlier in the year, there still exists strong probability that the Olds hydramatic transmission will be adopted in at least one other line of General Motors cars next fall if production facilities can be stepped up in time. Along with considerable other shifting of manufacturing facilities by Buick, Olds and Pontiac (officially known as the B-O-P series in the General Motors line) there is some discussion of plans to move all or part of Buick's transmission manufacturing equipment to the Detroit transmission plant which is manufacturing the hydramatic unit. It is also possible that the old building now occupied by the transmission plant (owned by Fisher Body) will be abandoned in favor of a new building on the outskirts of Detroit. So far the plant has had plenty of difficulty turning out enough transmissions to satisfy Olds' demand for the hydramatic transmission, and only recently has the plant come near the goal of 30 an hour for which it was tooled up. Existence of bottlenecks in the present line-up indicate that additional tooling may be installed for next year's production whether the transmission goes on other lines of cars or not. There has recently been substantial buying of equipment for a slightly larger transmission which has many parts interchangeable with the present design. If Buick demand is added to the current Olds' demand it is conceivable that

(CONCLUDED ON PAGE 115)

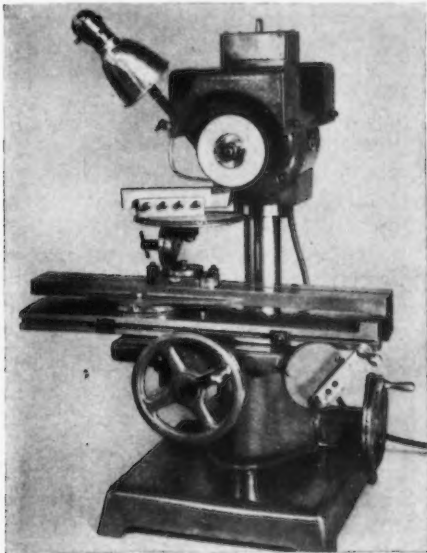
THE BULL OF THE WOODS

BY J. R. WILLIAMS



New Grinder Quickly Grinds Chip Breakers In Carboloy Steel-Cutting Tools

A chip breaker grinder especially adapted to the safe, rapid grinding of chip breakers in steel-cutting cemented carbide tools is announced by Carboloy Company. The machine is equipped with a simple Universal fixture that can be quickly set to produce a



chip breaker exactly to specifications. Chart furnished with each grinder gives exact setting for each of the three protractors on the universal fixture. By means of this, settings can be made to meet any given tool specifications, and exact duplication at any time is possible, a particularly desirable feature for regrounding Carboloy steel cutting tools. Write for leaflet GT-121 containing complete details.

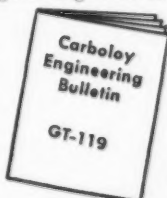
New Booklet Shows How Warner & Swasey Applied Carboloy Tools To 1500 Operations

In view of the noticeable trend toward the use of carbide tools broadly throughout the shop rather than as a special tool for difficult jobs, a new booklet recently issued by Carboloy Company is of unusual interest.

This 12-page booklet tells in detail how Warner & Swasey Company applied cemented carbide tools on approximately 1500 steel and cast iron operations, resulting in a 43% average increase in machine capacity on those jobs. Blueprints of tools used, time studies, and illustrations of typical applications are included. Send for booklet GT-403.

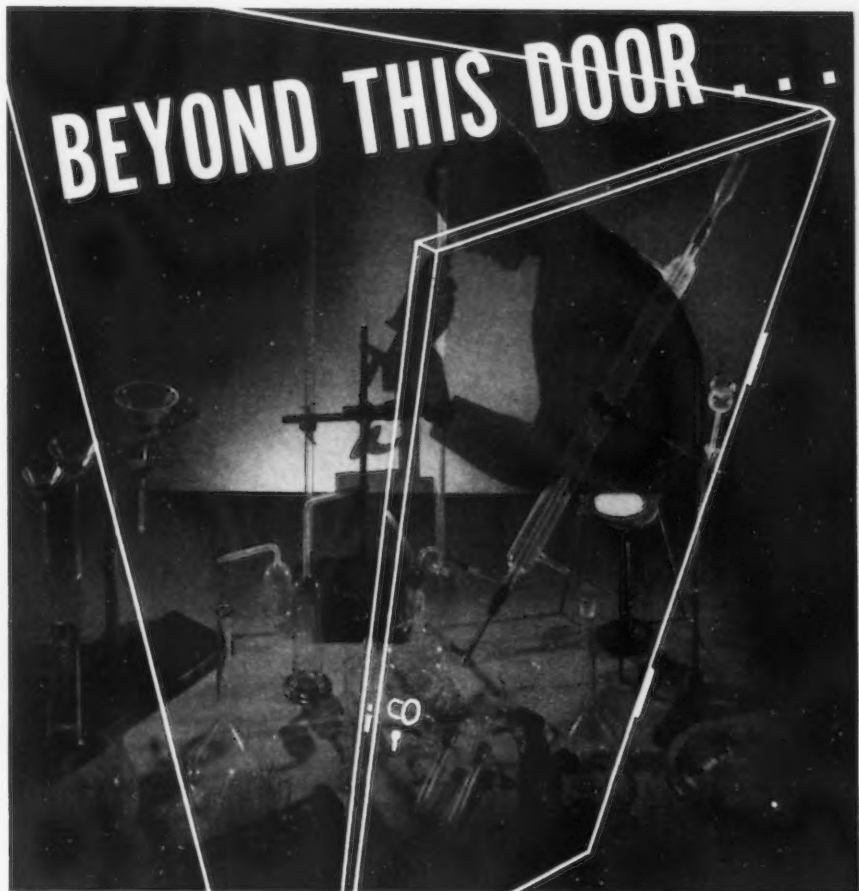
New Engineering Bulletin Gives Recommendations For Machining Ampco Metal

This new Carboloy Engineering Bulletin lists specific speeds and feeds for rough, semi-finish and finish machining of Ampco Metals with Carboloy cemented carbides. Bulletin also covers tool design, coolants, etc. Send for Bulletin GT-119.



Carboloy Drill For Maintenance Work Drills Holes In Concrete, etc., 75% Faster

Tip your maintenance man off to the Carboloy Masonry Drill. Drills concrete, tile, brick, slate, porcelain, etc., 75% faster than old methods. Send him leaflet GT-103.



Time never quite catches up with the men in our Research Laboratories. They deal largely with the possibilities of tomorrow. Their job is to obsolete the present, to constantly seek *better* methods, *better* equipment, *better* ways to make *better* Carboloy.

Often of far-reaching importance are the things they do. They impregnated Carboloy with diamond particles . . . and now those who dress grinding wheels have a diamond dresser that requires no resetting—no expensive stones . . . they applied this same material to the mining field—and it bids fair to revolutionize core drilling practice . . . they took microscopic particles of carbide—100 trillion to a pound of Carboloy—and “split them in two” to produce grades of Carboloy having an order of performance and life never before attained. . . . *NOW* they're perfecting a special extrusion process that turns out Carboloy by the yard—replaces

300-ton hydraulic presses. Things of this order they have done to mould “visions” into realities.

The “Tomorrows” of these men have made many things possible *today*. Carboloy is no longer just a cutting tool or a wire drawing die. It plays a part not only in *making* products but also has become an *actual part* of many products and machines. As a wear-resistant part, Carboloy is found in oil well pumps, spray guns, bread slicing machines, hydraulic equipment, business machines, refrigerating machines, saw sharpeners, machine tools, communication equipment, fish rods, etc. It helps to make such things as rayon, baby food, tomato juice, carbon resistors and coated welding rods.

Carboloy uses exceed the boundaries of your machine shop or wire mill. Carboloy is the Metal of Tomorrow with a thousand and one uses Today!

CARBOLOY COMPANY, INC., 11153 E. 8-Mile Road, DETROIT, MICHIGAN
CHICAGO • CLEVELAND • NEWARK • PITTSBURGH • PHILADELPHIA • WORCESTER, MASS.

CARBOLOY



TUNGSTEN CARBIDE—TANTALUM CARBIDE—TITANIUM CARBIDE

FOR CUTTING, DRAWING, SHAPING, EXTRUDING METALS AND NON-METALLICS

* FOR REDUCING WEAR ON EQUIPMENT OR PRODUCTS YOU USE OR MAKE *

THIS WEEK IN WASHINGTON

... Supreme Court decision on steel wage minimum expected by June 3 ... Reciprocal trade agreements program extended ... House Labor Committee pushes its plan revising Wagner Act, enlarging NLRB ... High court to decide whether trust laws apply to labor unions.

By L. W. MOFFETT
The Iron Age

WASHINGTON—The future of the Walsh-Healey Public Contracts Act as it affects minimum wages in the steel industry was in the hands of the Supreme Court this week after counsel for seven small steel mills in the East told the court during three hours of oral arguments on April 3 that the Government's steel wage order of January, 1939, violates a tradition of 40 years' standing in the industry and imposes a wage burden on Eastern mills so intolerable and inequitable that it had never been attempted before by any governmental agency.

Representing Lukens Steel Co., and seven other small Eastern steel mills, William Clarke Mason, of Philadelphia, argued that the Secretary of Labor's steel wage determination, which has never been in effect because of restraining orders granted the litigants, represented an attempt by the Secretary of Labor to read out of the Walsh-Healey law the usual interpretation of the word "locality" and to read into the law a discretionary power never intended by Congress.

Insists on Right to Bid

It has been the contention of Government counsel during the past year of litigation on the case that the steel company complainants, being only prospective bidders, had suffered no damage but Mr. Mason argued that the companies should be allowed freedom to deal with their customers without unlawful interference, insisting that the right to have bids considered by the Government cannot be denied by a third party—in this case the Secretary of Labor. The right to bid on Government contracts, Mr. Mason told the court, is "just as much a property right as any other ownership we have." He asserted that, despite Section 5 of the law, admittedly loosely drawn and

vague on the subject of the rights of aggrieved parties, "we have a right to go into a court of equity asking that the court control the arbitrary and capricious act of the Secretary of Labor."

Specifically, Mr. Mason complained that the Secretary of Labor in her steel wage order arbitrarily removed a line drawn through Altoona, Pa.—a division recognized in the NRA steel code and by other Government agencies for wage differentials of 40 years' standing in the industry—thereby subjecting steel mills in Eastern Pennsylvania to the same 62½c. minimum rate specified for mills in the Pittsburgh, Youngstown and Chicago districts. Prompted by a question from the court, Mr. Mason said that the 56½c. rate paid by eastern Pennsylvania mills was the result of higher production costs in the area resulting from various economic disadvantages.

Determination of "Locality"

With Secretary of Labor Frances Perkins, members of the Public Contracts Board, representatives of the steel industry and observers for the CIO in attendance, counsel for the steel companies emphasized that the Walsh-Healey law is not a wage fixing statute and that the Secretary of Labor in her steel wage decision did "exactly what Congress tried to prevent her from doing when it framed the law."

Much of the arguments before the court revolved around the word "locality"—the heart of all wage determinations made under the law since it was put on the statute books in 1936. The law empowers the Secretary of Labor to determine industry by industry, the prevailing minimum rates of wages within a locality and to prescribe these rates as mandatory for all companies contracting with the Government.

Solicitor General Francis Biddle, representing the Government's position, told the court that the word "locality" in broad and flexible sense has been upheld time and again by the courts although not in cases involving the Walsh-Healey Act. On the other hand, Mr. Mason maintained that Congress intended a highly restrictive meaning, interchangeable with "community," and that in any event it never intended that the word could be enlarged in scope to cover the entire country as has been done in other industries brought within the provisions of the law.

Counsel for the steel litigants told Associate Justice Stone that the state of Pennsylvania could not even be construed as being one "locality." He argued that through the unwarranted interpretation followed by the Secretary, she arbitrarily combined a 62½c. locality with a 56½c. locality, thereby determining that the prevailing minimum wage in the larger area was 62½c. by virtue of the greater number of employees receiving the 62½c. rate.

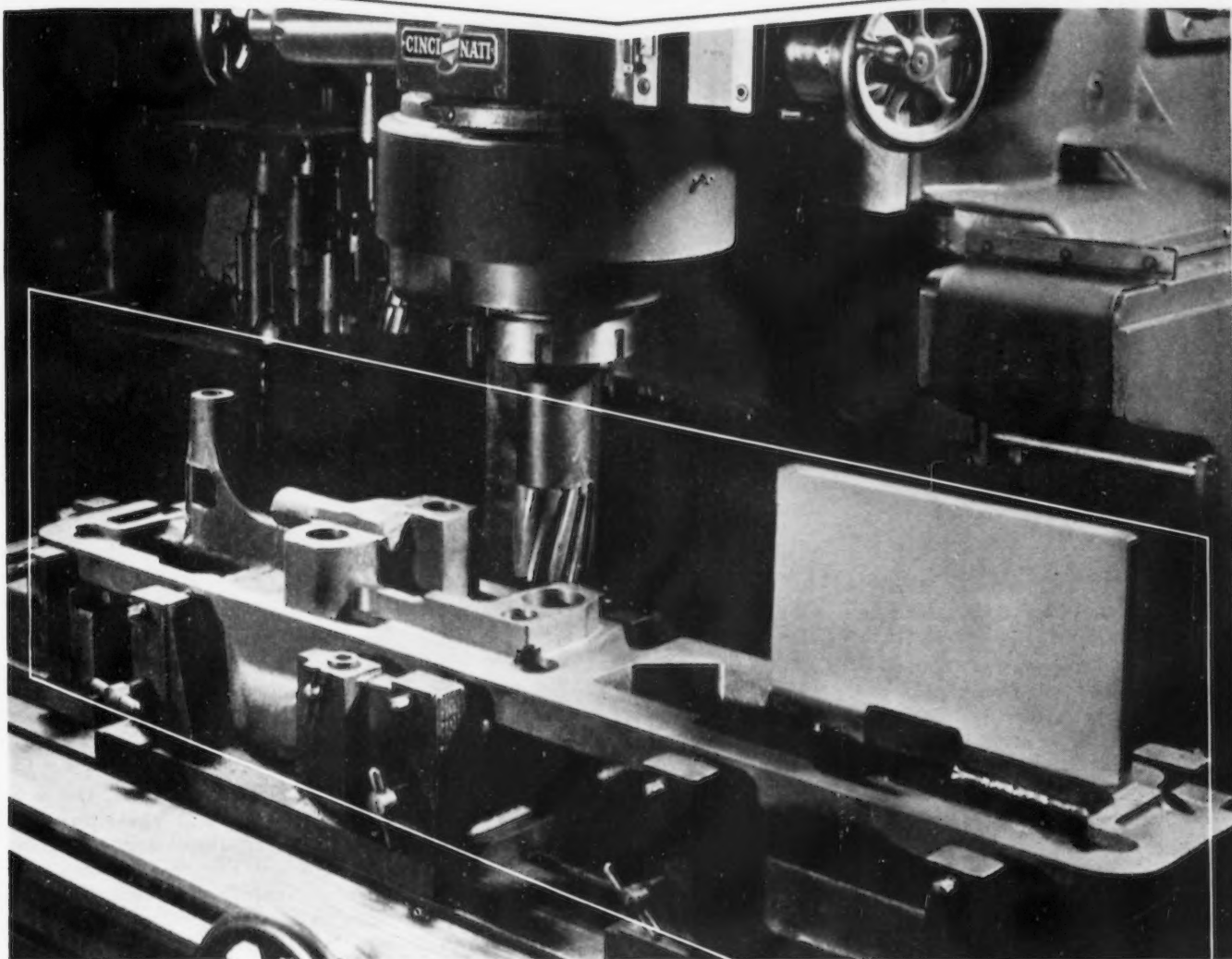
Rights Not Impaired

Government counsel in laying the foundation for his argument declared the rights of the steel companies had not been impaired, that the Secretary under the law was justified in making her determination in the steel industry, and that the suit is invalid because it is in effect a suit against the United States and cannot be maintained without its consent.

On the latter point, the solicitor general characterized as "mere fiction" the argument of the steel companies that where, as in the present case, an official of the Government oversteps the bounds of statutory authority, she acts not as a representative of the Government but as an individual.

Questions from the bench came most frequently from Associate Justices Black and Frankfurter. Associate Justices Stone, Roberts and Reed limited their questions to one or two. At one point Justice Black, who was a member of the Senate when the Walsh-Healey law was passed, said he could not see how the rights of the complainants had been impaired and later questioned Mr. Mason's interpretation of "locality." Justice Black said that reference to the record of proceedings in the House of Representatives during debate on the Walsh-Healey law indicated that there appeared to be

THIS INTRICATE BRACKET MILLED COMPLETE ON A CINCINNATI VERTICAL HYDRO-TEL

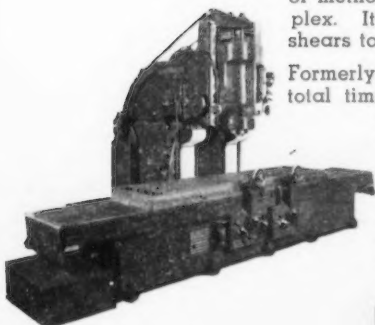


... SAVING 254 MINUTES EACH

Intricate castings, like the hydraulic unit bracket illustrated here, usually tax the ingenuity of methods engineers to their limit. In this case, the milling operations are especially complex. It takes a machine having a large capacity and the maneuverability of a tailor's shears to keep the machining cost within reason.

Formerly two different machines were required to completely mill these brackets, and the total time averaged 572 minutes per casting. Now, the part is milled complete on one CINCINNATI Vertical Hydro-Tel in 318 minutes, **SAVING 254 MINUTES PER PIECE, OR 44%.** At this rate, the machine will pay for itself in a very short time.

There are several features which make possible these savings. Finger-tip control of the heavy slides—table, cross ram, and vertical head . . . independent and non-related power feeds for the table, cross ram, and vertical head . . . exceptionally accurate positioning of the table . . . others described in catalog M-796. Write for your copy today.



**THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED**

Manufacturers of

Tool Room and Manufacturing Milling Machines
Surface Broaching Machines Centertype Grinding Machines Cutter Sharpening Machines
Centerless Grinding Machines Centerless Lapping Machines

considerable difference of opinion on the scope of the word "locality." In illustrating his point he read from a statement by Representative Earl C. Michener, Republican of Michigan.

Earlier Mr. Mason had referred to a statement by Representative Francis E. Walter, Democrat of Pennsylvania, in substantiation of the argument that Congress intended a restrictive use of the word. He told the court that Mr. Michener was a bitter opponent of the Walsh-Healey law and that the Congressman undoubtedly had his tongue in his cheek when he made the assertion. It was Mr. Mason's opinion that even the Michigan Congressman conceded that a locality was a community.

Questioned by Frankfurter

Likewise, Justice Frankfurter questioned Mr. Mason on the definition of the term locality and later sharply disagreed with the steel attorney on the significance of a former Louisiana case brought against the Secretary of the Treasury. Mr. Mason insisted that the case was not in point in the consideration of the question of when a suit is one against the United States.

The Supreme Court agreed to review the steel wage case at the request of the Government after the Circuit Court of Appeals for the District of Columbia ruled in favor of the steel companies in October, 1939, holding that the Secretary of Labor exceeded her statutory authority and misconstrued the word "locality" in the Walsh-Healey Act.

The Labor Department instituted the steel wage determination in the summer of 1938 when it heard representatives of the steel industry and the CIO at public hearings. Recognized by the CIO as an invaluable organizing weapon against the Bethlehem Steel Co., the recommendations of the three-man Public Contracts Board were handed down a few days before the November, 1938, elections. While the majority recommendations divided the country into two steel wage areas, the minority recommendation called for several wage areas and recognized the existing geographical wage differential of steel mills located east of a line running north and south through Altoona, Pa.

The Secretary of Labor subsequently moved to meet opposition to the recommendation by proposing to divide the country into six areas and prescribing rates ranging from 45c. in the South to 62½c. in the Pittsburgh, Youngstown and Chicago districts and including in the highest wage area mills in eastern Pennsyl-

vania, Sparrows Point, Md., and New England.

Shortly after the order became effective early in March, 1939, a restraining order was issued and steel mills have continued since that time to bid on Government work without regard to the steel wage order.

If the Supreme Court rules in favor of the Government, it will order the restraining order terminated. The Secretary's wage order would go into effect immediately. If the high court sustained the lower court's decision restricting the scope of the word "locality," presumably the Labor Department's Public Contracts Division would have to start over from scratch and lay a new foundation for minimum steel wages. The country would probably be divided into more wage areas, adhering more closely to existing wage differentials.

Reciprocal Trade Pact Program is Extended

WASHINGTON — A three-year extension of the Administration's reciprocal trade agreement program, provided for in a bill which passed the Senate by a 42-to-37 vote, awaited White House signature this week. The Senate vote last Friday terminated a fight of several weeks in both Houses of Congress.

Shortly before the Senate took final action on the measure, an amendment designed to terminate eventually manganese tariff concessions in existing trade agreements was defeated by a vote of 48 to 30. Referring to manganese as "the No. 1 strategic and critical mineral for national defense," Senator Chan Gurney, Republican of South Dakota and sponsor of the unsuccessful amendment, told the Senate that his proposal was necessary for the national defense and would stimulate development of the domestic manganese industry. Total imports from Sweden and Belgium was 41,538 tons.

Also read into the record during Senate debate was a report from the State of Pennsylvania showing that total iron and steel imports from Sweden and Belgium imported by this country under trade agreement rates in 1937 amounted to 41,538 tons. Prepared by Pennsylvania's commerce department and submitted for the record by Senator James J. Davis, Republican of Pennsylvania, the report estimated

that the total amount of iron and steel products, including bars, rods, ingots, billets, sheets, pipes, tubes, wire, and strip admitted in 1937 under trade-agreement rates aggregated 23,109 tons from Sweden and 18,429 tons from Belgium.

Although the law's constitutionality is not in issue, an opinion sustaining the Circuit Court's decision would probably bring about a collapse of all wage determinations thus far made for other industries under the law. In such an eventuality, it is conceivable that the law would fall into disuse. Because the Walsh-Healey law has been largely supplanted by the Fair Labor Standards Act and because both War and Navy Departments object to it as placing undue hazards in the way of the defense contracts, it is regarded as likely that the Labor Department would think twice before attempting to revamp the entire Walsh-Healey wage structure.

A Supreme Court decision is expected shortly before the court takes its summer recess. The last decision day of the current session may be May 27 or June 3.

that the total amount of iron and steel products, including bars, rods, ingots, billets, sheets, pipes, tubes, wire, and strip admitted in 1937 under trade-agreement rates aggregated 23,109 tons from Sweden and 18,429 tons from Belgium.

The 41 Senate Democrats, who were joined by Senator George Norris, Independent of Nebraska, in voting for final passage, included Southern low-tariff advocates and representatives of industrial sections which have benefited from the stimulus given exports of manufactured products. Senator Carl A. Hatch, Democrat of New Mexico, and Carl Hayden, Democrat of Arizona, were the only Westerners to support the trade agreements program.

Inland Steel Freighters Open Lake Traffic

THE Philip D. Block and the L. E. Block, Lake freighters of Inland Steel Co., again are said to be the first ships to open navigation on the Great Lakes. They have started from Indiana Harbor for Port Inland at the north end of Lake Michigan. At that point they will load limestone for the Inland blast furnaces and open hearths. Within a few days other Inland freighters are expected to make their first attempt to cut through the ice at the Straits and into Lake Superior on their first spring trips for iron ore.



DEEP in the hidden assemblies of these refrigerators . . . where friction, wear, and replacements must be guarded against . . . you will find *Everlock* washers at all critical points.

These sturdily-built refrigerators operate economically and efficiently because *Everlock* washers keep vital parts intact! Pictured are three refrigerators and one compression machine, the manufacturers of which used various types of fasteners and methods for holding their machinery parts together before adopting *Everlock* washers.

Today they and other refrigerator manufacturers find that *Everlock* washers do the job more satisfactorily than other types tried out.

Photographs through courtesy of
Kelvinator—Division of
Nash-Kelvinator Corp.
Sears, Roebuck & Co.
Servel, Inc.
Stewart-Warner Corp.

THOMPSON - BREMER & CO.
1640 WEST HUBBARD STREET • CHICAGO

Where Other Washers Have Been Tried . . . Now Everlocks Are Specified

SAVE

WITH

C-F

WELDING POSITIONER

Now available in 4 sizes—
1200 lb. and 2500 lb. capacity. Hand
or motor operated optional. 6000 lb.
and 14,000 lb. motor operated only.

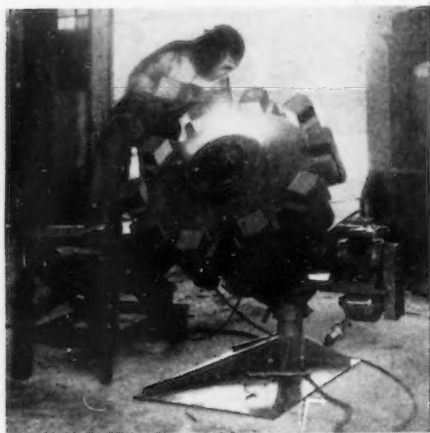
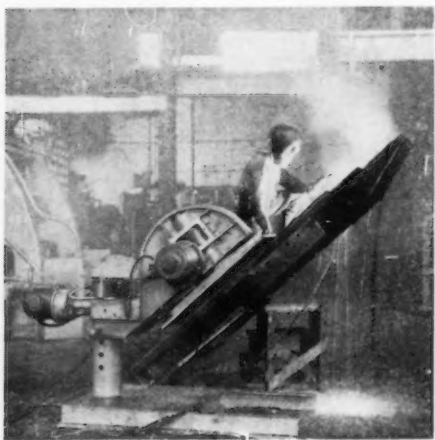


Table tilts 135° from horizontal.

Table can be rotated 360° when
tilted at any angle.

Adjustable in height.

Table is removable if desired for spe-
cial requirements.



Write for Bulletin WP-19.

CULLEN-FRIESTEDT COMPANY

1303 S. Kilbourn Ave.
Chicago, Ill.

Locomotive Cranes, Car Pullers, Buckets,
Sheet Lifters.

High Court to Decide Whether Anti-Trust Laws Apply to Unions

WASHINGTON—Placed before the Supreme Court last week for final decision was the warmly debated question whether a labor union is subject to the anti-trust laws. The issue centered about arguments in the case of the Apex Hosiery Co. of Philadelphia, which, through its counsel, Sylvan H. Hirsch, asked the highest judicial tribunal to reverse a decision of the Federal Circuit Court at Philadelphia declining to sustain a \$711,932 anti-trust judgment by the Federal District Court, also at Philadelphia, against CIO's Local 706, American Federation of Hosiery Workers. The lower court's assessment was for triple damages against the union and resulted from a seven-week sit-down strike. This is the first suit for treble damages growing out of a sit-down strike to come before the Supreme Court.

Turning to the Federal Government's suits against labor unions, Mr. Hirsch quoted Assistant Attorney General Thurman W. Arnold to sustain the contention that labor unions are subject to the anti-trust laws. Impetus to the department's drive against illegal acts also was given by a recent decision of Justice Peyton Gordon of the District Court at Washington holding that AFL's Drivers, Chauffeurs and Helpers Union must answer the Government's anti-trust charges of conspiring to restrain trade. This ruling came upon the heels of an opinion of the United States Circuit Court of Appeals of the District of Columbia upholding the Department of Justice charge that restraints upon the lawful practice of medicine are forbidden by the Sherman act. Aroused over the ruling the medical profession, like organized labor, has taken to the Supreme Court the claim that it is not subject to anti-trust laws.

Different Status Claimed

In pleading organized labor's immunity, Isadore Katz, counsel for the CIO Union in the Apex case, told the Supreme Court that activities of the union in the strike did not come within Federal power under the Sherman law. He insisted that Congress intended to exclude labor unions from the law. He urged that local activities, such as a sit-down strike, do not restrain commerce within the meaning of the Sherman act unless they are part of a conspiracy to control supply or fix prices of goods moving in interstate commerce.

Contending that employers have the right to sue unions for treble damages under the Sherman law, Mr. Hirsch said that labor was given immunity only so far as its activities were "lawful and peaceful." He said that the Federal District Court had found the union guilty of an intention to restrain commerce. Reasons were cited to prove such intention. Listing them, Mr. Hirsch declared that the union issued a card pledging the signer to join the union and go on a sit-down strike to compel full recognition of the union and its demands; that the union seized the Apex plant, excluded company officials from it and wrecked machinery; that William Leader, union president, said that the union would hold possession till the closed shop demand was granted; that the strikers were enabled to remain in possession of the plant and prevent manufacture of goods in interstate commerce by reason of getting cots, blankets and strike pay from the union; and that the union refused to permit shipment of hosiery to customers.

Restraint of Commerce Cited

Counter to the argument of the union's counsel, Mr. Hirsch declared that examination of the Sherman law led inescapably to the conclusion that Congress intended that the act should apply to union activities in restraint of commerce. By seizure of the plant, Mr. Hirsch said, the union prevented interstate shipment of finished materials and burdened and restrained interstate commerce. To support his argument, Mr. Hirsch cited Supreme Court decisions in the Jones & Laughlin Steel Corp.—Wagner act and other cases in which it was held that direct and immediate effect upon commerce resulted from the stoppage of a single factor in the flow of commerce.

Argument was made by Mr. Katz that the Federal District Court jury did not find that the union intended to conspire to restrict competition in interstate hosiery markets by monopoly or by fixing prices, nor that the consequences of the sit-down strike were such as to compel an inference of such intent. The union attorney said he did not believe the Wagner act could be utilized to strengthen the anti-trust law against the very organizations "upon which national policy relies to achieve the socially desirable ends which the Sherman act failed to bring about." It was maintained that it was fallacious to assume that a strike

**Heat treated to above 400 BRINELL...
yet READILY MACHINABLE**



NICKEL ALLOY STEELS

For parts subject to high stresses in service, heat treatment *before* machining offers many advantages. Warpage and distortion frequently resulting from heat treatment after machining are minimized. In addition, points of stress concentration are avoided resulting in considerably greater life for the machined part when placed in service.

Especially interesting are present shop practices of airplane part and other mass production plants now machining heat treated Nickel alloy steels ranging in hardness up to 450 Brinell. (*above*) Stressed Hydromatic Propeller spiders of SAE 4340 heat treated to approximately 415 Brinell are machined with ease in the regular production line at the East Hartford, Conn. plant of Hamilton Standard Propellers, Division of United Aircraft Corp.

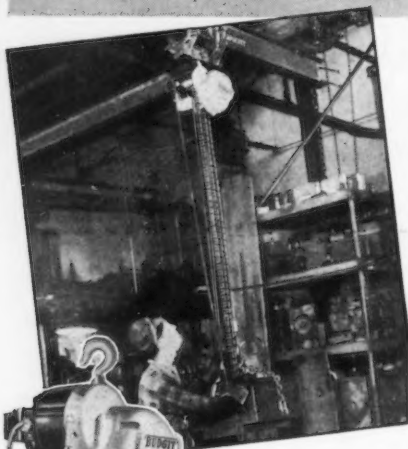
In a recent demonstration on a standard Warner & Swasey turret lathe conventional high speed tools readily turned, chamfered and drilled a 2" bar of Nickel-chromium-molybdenum steel at a hardness of 450 Brinell. The turning cut was fed at .012" at a speed of 42' a minute. The close helical chip showed no tendency to tear, check or burn. The smooth surface produced indicates that machining Nickel alloy steels at high hardness is not unusually difficult.



Hamilton Standard Propellers, Division of United Aircraft Corp., East Hartford, Conn. regularly machine SAE 4340 stressed Hydromatic Propeller parts including spiders, illustrated here, and cams after they have been heat treated to approximately 415 Brinell. Hard Nickel alloy steels are no hazard where machining is concerned. For additional information please write to the address printed below:

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK, N. Y.

Make Thin Budgets Larger ...Use "BUDGIT" HOISTS!



A sizeable "expense" item can be taken out of any budget by installing "Budgit" Hoists wherever lifting is now done by hand or with chain blocks . . . they change 20 to 40% and more of the WAITING time of men and machines into added WORKING time.

"Budgit" Hoists come in 250, 500, 1000, and 2000 pounds lifting capacity with speeds to suit today's tempo . . . All weigh so little you can move them from job to job.

All budgets can afford "Budgits"! Prices start at \$119. Nothing else to buy before you can use them. You simply Hang Up, Plug into the nearest electric socket, and Use!

Send for catalog containing complete information, also "Time Savings Calculator" that shows savings they earn.

SHAW-BOX CRANE & HOIST DIV.
MANNING, MAXWELL & MOORE, INC.
402 BROADWAY • MUSKEGON, MICH.

Makers of all types and sizes of Electric and Hand Operated Cranes and Electric Hoists . . . Send your crane and hoist inquiries to "Shaw-Box"!

**Portable Electric
"BUDGIT" HOISTS**

which actually stopped production necessarily falls under the Sherman act. In the Fredman-Harry Marks Clothing Co. case the Supreme Court held that unfair labor practices were within Federal power because they tended to a labor dispute burdening commerce. Mr. Katz said the decision did not justify the assumption of Mr. Hirsch.

Wants "Limited Immunity"

A brief filed by the CIO as a "friend of the court" contended that Section 6 of the Clayton anti-trust act was intended to grant "limited immunity" from anti-trust laws upon labor unions. The limited immunity was said "to extend to all of the activities undertaken by labor unions when acting by themselves, whether it be entering into a collective bargaining agreement or a strike, boycott or picketing. The coercive or violent nature of the action is immaterial. Other laws are available to punish criminal acts."

The CIO brief added:

"On the other hand, the immunity does not extend to any combination of labor and other persons engaged in a particular business or industry, which combination may be a restraint of trade as that term has been defined under the law. Thus, if a labor union joins with manufacturers and dealers in a combination, which without the presence of the union, would be unlawful under the anti-trust laws, that combination cannot have the benefit of an immunity given to a combination of labor alone and the union entering into that combination loses its immunity."

Also "as a friend of the court" the Labor Law Committee of the National Lawyers Guild filed a brief in which it was contended that while the Sherman act may be applied to "labor unions" it cannot be applied to "labor disputes."

St. Louis Decision Cited

Meanwhile, the AFL has hailed a recent decision at St. Louis by Judge C. B. Davis of the Federal District Court, which the Federation says, "is expected to prove a severe blow to Thurman Arnold's campaign to place organized labor under the thumb of the Federal Government." The court dismissed Government indictments against officials of AFL's United Brotherhood of Carpenters and Joiners. It was held that the Government had failed to show a conspiracy to restrain interstate commerce. The case, like that passed upon previously by Justice Gordon at Washington, related to a Federation jurisdictional dispute. But, unlike Justice Davis, Justice Gordon held that activities of the Drivers and Chauffeurs was an illegitimate effort to restrain trade and interfere with the collective bargaining

rights of another union—the Engineers Union. Judge Davis held that "the real purpose of the defendants, as disclosed by the indictment was not to restrain commerce but to prevail in a local labor controversy." The court declared that labor unions engaging in jurisdictional strikes are immune from suit in the Federal courts so long as lawful means are employed, under the provisions of the Norris-La Guardia act of 1932.

Those who contend that the federation's claim of victory may prove unjustified, point out that, whatever the merits of the two cases, the differing decisions do not afford a comparison respecting the application of the anti-trust laws to labor unions. In the St. Louis case, it was found that the defendants had not restrained commerce. Judge Davis therefore did not pass upon the question of labor union liability under the anti-trust act. Immunity of labor unions from suit in jurisdictional strikes so long as lawful means are employed, it is maintained, is to be taken as a matter of course. Mr. Arnold charges restraint of trade and was sustained by Justice Gordon. The varying decisions were said to emphasize the importance of a final ruling by the Supreme Court, assuming like elements in the two cases.

Nevertheless, the AFL said Judge Davis' decision "completely destroyed the basis for all anti-trust indictments growing out of jurisdictional disputes that have been filed by Thurman Arnold" and that the decision "directly controverted the recent ruling" of Justice Gordon.

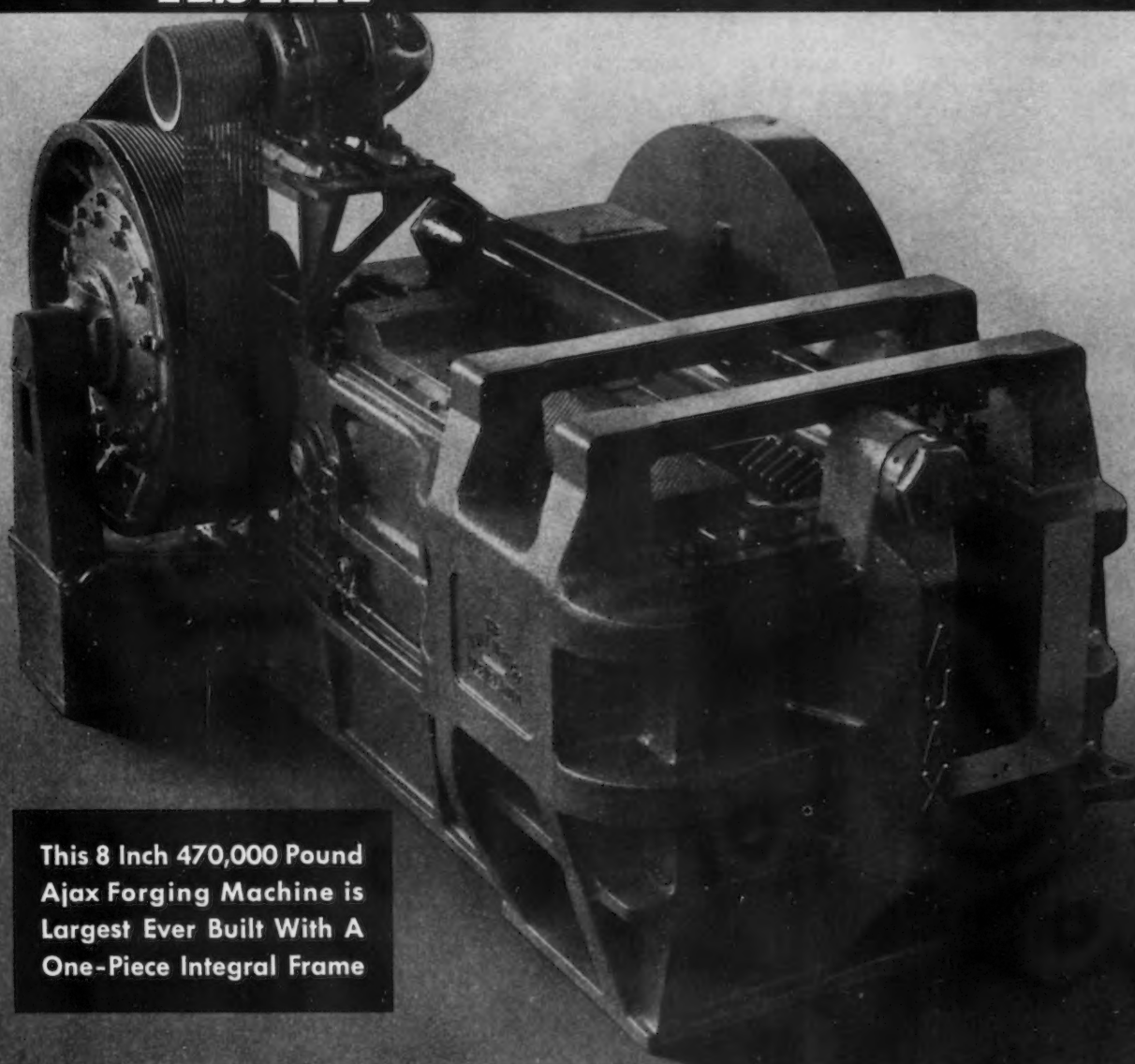
"The decision of Judge Davis," it was declared, "was a major victory for the American Federation of Labor which has vigorously contended that labor unions cannot be prosecuted under the anti-trust laws."

New Mines Bureau Head

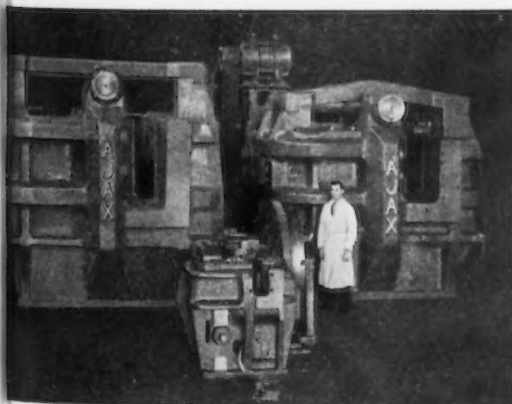
WASHINGTON—Dr. R. R. Sayers, senior surgeon of the United States Public Health Service, last Friday was detailed by President Roosevelt as acting director of the Bureau of Mines. He succeeds John W. Finch, whose removal as director by Secretary of the Interior Harold L. Ickes aroused resentment among industrial and mining interests.

Dr. Sayers was head of the Health and Safety Branch of the Bureau of Mines during the period of 1915-1932, at which time the branch was part of the Public Health Service. It has not been indicated whether a permanent director of the Bureau will be chosen soon.

CLOSE TOLERANCES • SPEEDIER PRODUCTION of a wide range of heavy duty forgings accomplished with **AJAX** 8 INCH FORGING MACHINE



This 8 Inch 470,000 Pound
Ajax Forging Machine is
Largest Ever Built With A
One-Piece Integral Frame



The dimensions of the 1 inch Ajax Forging
Machine in foreground contrasts strik-
ingly with gigantic bulk of 8 inch machine.

This AJAX 8 inch Forging Machine is designed to accommodate dies 46 inches in height, permitting as many as four progressive operations on large stock in fabricating heavy duty forgings.

Unusual rigidity of the one-piece integral frame assures die alignment that results in forging to close tolerance, effecting considerable savings in stock and machining.

Instantaneous response of air clutch to operator's tripping of control speeds up production . . . increases output. (Operates as easily as smaller sizes).

Handles wider range of jobs. Die life substantially lengthened.

WRITE FOR BULLETIN No. 65-A

THE **AJAX**

MANUFACTURING COMPANY

621 MARQUETTE BLDG.
CHICAGO, ILLINOIS

EUCLID BRANCH P.O.
CLEVELAND, OHIO

201 DEWART BUILDING
NEW LONDON, CONN.

Invention, Creating Jobs, Nation's No. 1 Need, Kettering Declares

WASHINGTON — Inventions and new scientific discoveries are the nation's number one needs, according to Dr. Charles F. Kettering, vice-president, General Motors Corp. and general manager of its Research Laboratories Division. Coming at a time when the TNEC is holding a hearing to determine the effect of technology on labor, his remarks were held to be exceptionally appropriate.

Speaking as chairman of the United States Patent Law Sesquicentennial Committee which sponsored observance on April 10 of the 150th anniversary of the signing of the first Patent Act by George Washington in 1790, Mr. Kettering said that in the early days of this country the greatest necessity was man power with the result that labor saving inventions and machinery were developed. Listing the inventions, Mr. Kettering said they made it possible to take abundant natural resources and out of them create all of the wealth of the nation.

"Our problem now is to supply more new labor-creating industries, like the automobile and the electrical industry, through industrial research," said Mr. Kettering. "Now we have an excess of man power, money and materials. We need more things to use up these abundant resources. We need to turn our research and development programs to supplying projects — new products and present ones in larger quantities—so that the present excess of men will be put to productive work increasing the wealth, happiness and well being of the country.

None Can Read Future

"We don't have the slightest idea of the exact nature of the things that will be needed in the future. If we knew what they were, we would be well on our way to having them now. We can say there is enough unfinished business to supply thousands of problems for industry and science to work on. No problem can be recognized as a new industry when it is in the test tube stage, but industries employing large numbers of men are founded on simple laboratory experiments. We need anything that will put men back to work.

"Every line of endeavor, business, government, science, engineering and even economics has its unfinished busi-

ness. Take a few simple examples of physics. What is friction? Why is glass transparent? Why are some substances good conductors and others poor conductors of electricity, or heat, or sound? Answers to any one might profoundly affect our present machines. Any one might lead to vast new industries and create another labor shortage."

Unfinished Business

Dr. Kettering listed the following ten lines of "unfinished business":

Adequate housing; modern highway system; preventatives and cures for

man's ills, such as colds and cancer, etc.; communications, including facsimile transmission and television; air conditioning; fundamental information in the basic sciences of physics and chemistry; knowledge of plant growth for better agriculture; improved transportation systems, including land, water and air; more efficient modern cities; and better knowledge of the properties of materials both natural and synthetic. Dr. Kettering continued:

"It is a fallacy to believe that we have reached the end of the road of progress. The frontiers of science and industry ahead hold promise of new jobs and new improvements in the standard of living surpassing even the progress of the past which has made this the most envied nation on earth."

House Labor Committee Pushes Its Plan Revising Wagner Act

WASHINGTON—Controversy over revision of the Wagner labor act at the present session has been heightened by action of the House Labor Committee in reporting out a bill and its attempt to enforce its passage through parliamentary tactics. Strongly approved by the American Federation of Labor, the bill is as vigorously opposed by the Congress of Industrial Organizations and Labor's non-Partisan League and industry generally.

While John L. Lewis' CIO and non-Partisan League share opposition with industry to the bill, their reasons for doing so obviously are divergent. Mr. Lewis wants no change in the law at all. Industry thinks the bill is too mild, that it hardly affects the fundamental objections to the act. It favors the more sweeping amendments proposed by majority members of the Smith Special House Committee which is investigating the National Labor Board. AFL President William Green has endorsed the labor committee bill because it proposes amendments for which his organization long has contended.

Board Additions Proposed

Known as the Norton bill because the Labor Committee is headed by Mrs. Mary T. Norton, it would:

Add two members to the three-man labor board.

Require board recognition of craft unions for purposes of collective bar-

gaining when a majority of a workers' unit decides it wants such representation. The federation especially favors this amendment while CIO is bitterly opposed to it.

Permit employers to petition the board for an election when rival unions are engaged in a dispute over representation.

Require that collective bargaining contracts shall continue in force for at least a year.

The Labor Committee has announced it will ask suspension of rules sometime before April 15 in order to put through its amendments. Such a rule would circumvent the Rules Committee and bar consideration of the Smith amendments. There does not appear to be any chance of the House voting for suspension for the rules. To do so would require a two-thirds majority, a vote that appears improbable since there is a strong House sentiment for the Smith amendments. Hence, there is an expectation that the House, rather than passing the Norton bill, might pass the Smith bill, possibly after some modifications. However, this step toward enactment of the Smith amendments no doubt would be stopped in its tracks by the Senate Labor Committee, which is dominated even more than the House Committee by administration forces, led by Senator Wagner of New York and Chairman Thomas of Utah.

The Senate Labor Committee majority, it is understood, is unwilling even

Yankee Clipper

MUST FLY THE ATLANTIC
ABOUT 1,000 TIMES



*THE NEW
DODGE-TIMKEN
DOUBLE INTERLOCK
PILLOW BLOCK



TO EQUAL THE **30,000 Hours** SERVICE
BUILT INTO THIS NEW DODGE-TIMKEN BEARING

THIS is more than the announcement of a new bearing. It is really the announcement of a complete line of Dodge Rolling Bearings offering complete coverage of industrial bearing requirements and each designed to give 30,000 hours of trouble-free service . . . The Dodge-Timken Double Interlock Pillow Block is rugged—easy to install—hermetically sealed and designed to give 30,000 hours service under conditions for which it is adapted . . . Dodge Rolling Bearings prove themselves on the basis of production profits—there is a size and type for every job—many of them are carried in local distributor stocks for immediate delivery

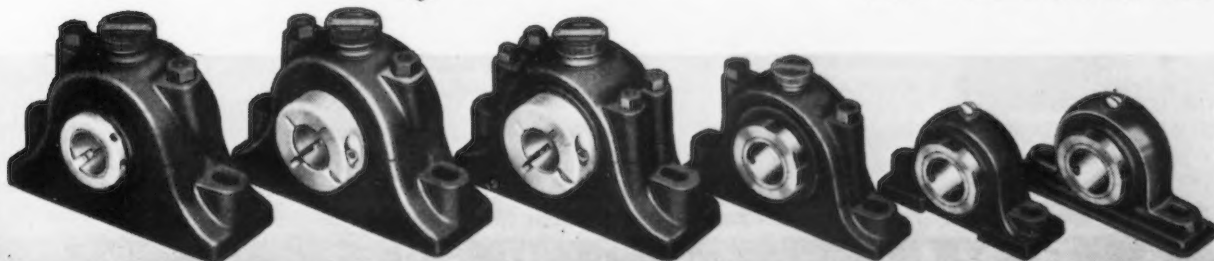
DODGE MANUFACTURING CORPORATION, Mishawaka, Indiana, U. S. A.



DODGE
MISHAWAKA

REAL HELP FOR YOU

The simple, conveniently arranged selection tables in this NEW Bulletin A-325 takes the guesswork out of bearing selection—send for your copy today.



*THE 30,000 HOUR LINE OF DODGE ROLLING BEARINGS

to accept the House Labor Committee amendments in their entirety. But, it is reported, that as a matter of jockeying labor legislation into inaction at the present session it might accept the amendments in their present or modified form, and put them through the Senate. Going to conference, the legislation could be stalled up to adjournment by the simple process of studied disagreement between Senate and House conferees.

Senator Wagner has said he would

approve the amendment to enlarge the board and the amendment to grant employers the right to petition the board for election in case of representative disputes between rival unions. Actually the board, yielding to pressure, has revised its rules to permit such elections.

The most controversial Norton amendment centers around determination of the proper bargaining unit. The craft amendment, Mr. Green says, will not bar industrial unions. He

claims it merely gives the workers the right to decide whether they want a craft, plant or industry-wide unit. Mr. Lewis on the other hand says that "the craft amendment, in particular, constitutes a declaration of war on CIO industrial unions and will be vigorously fought as a threat to the very existence of our organization."

Going further, Mr. Lewis said that CIO and the non-Partisan League will conduct a national campaign against the Norton amendments and "all other amendments to emasculate the Wagner act, defeat its basic purposes and turn it into an instrument for the oppression of labor."

While Mr. Lewis has turned thumbs down on the New Deal and therefore the administration does not feel obliged to pet and pamper him as much as in the days of their political affiliation, his voice still attracts administration attention. Nevertheless, Mrs. Norton, ardent New Dealer, says she will stand by the House Labor Committee bill. The committee adopted the amendments by a vote of 13 to 8.

NLRB Revises Policy For Run-Off Elections

WASHINGTON—The National Labor Relations Board recently announced a change in the form of ballots used in run-off elections.

The board took this action in a case involving the employees of R. K. LeBlond Machine Tool Co., and Cincinnati Electric Tool Co., both of Cincinnati. Handing down three separate opinions in the case, the board's action constituted a reversal of its practice of dropping the union receiving the lower vote from the ballot in run-off elections. In the past it has been the board's practice to direct a run-off election by dropping the union receiving the lower number of votes and by providing that the employees then vote for or against the labor organization which received the plurality.

In the run-off election to be held within 30 days among the employees of R. K. LeBlond Machine Tool Co., and Cincinnati Electrical Tool Co., the board ruled that the ballot should make provision for both CIO's Amalgamated Association of Iron, Steel and Tin Workers, and the Independent Employees Organization, but that the space provided for rejection of both should be omitted. On Feb. 14, a secret ballot election was held among the employees. The tabulation showed 266 for the CIO affiliate; 236 for the Independent; and 44 for neither.

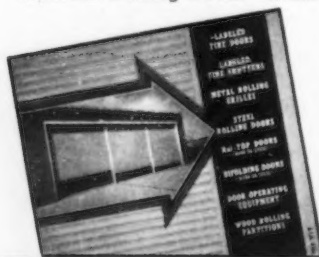
Save... WITH RUGGED STEEL DOORS THAT COIL ABOVE THE OPENING!



It's easy to see **why** the coiling, upward action of Kinnear Rolling Doors saves you money. Kinnear's rugged all-steel curtain of strong, interlocking slats can't warp, sag, split, or pull out of shape. It defies weather, repels fire, prevents intrusion, and resists wear! The doors operate quickly, smoothly and easily all year long, because they open over snow, ice and swollen ground. They require no usable space, and they open out of reach of damage by wind or vehicles. You get all these advantages—and many others—with Kinnear Rolling Doors. It will pay you to know more about the economies they afford . . . to learn why so many industrial firms are specifying Kinnear Rolling Doors. Write for the complete Kinnear catalog!

KINNEAR MOTOR OPERATION ADDS EXTRA EFFICIENCY!

The time saving convenience of electric push-button control can easily be added to any Kinnear Rolling Door. With motor control, doors can be opened quickly from any number of convenient points. The heavy-duty, soundly engineered Kinnear Motor Operator is built to serve economically, for years!



Kinnear also makes **STEEL ROLLING FIRE DOORS**—approved by Underwriters' Laboratories—for safe, automatic fire protection . . . **STEEL ROLLING GRILLES** for positive, convenient protection without sacrifice of light, air or vision . . . **WOOD and ALL-STEEL RoL-TOP DOORS**, rugged, dependable, sectional-type upward-acting doors. Full details in the Kinnear catalog!

Offices and Agents in All Principal Cities
THE KINNEAR MFG. COMPANY
1760-80 Fields Ave. Columbus, Ohio
Factories: Columbus, Ohio; San Francisco, Calif.

KINNEAR

ROLLING DOORS

Farm Equipment Produced In '39 Valued at \$469,356,740

WASHINGTON—The value of farm equipment and related products manufactured in 1939 declined to \$469,356,740 from \$490,013,369 in 1938 and \$580,048,914 in 1937, according to the Bureau of the Census. Comparative values of the more important classes of farm equipment (000 omitted) follow:

	1939	1938	1937
Tractors	\$203,569	\$196,217	\$268,394
Harvesting machinery	47,961	71,522	46,602
Plows and listers ..	20,005	26,817	33,042
Crop preparing machines	19,525	22,572	20,471
Planters, seeders, fertilizing machinery	14,362	20,246	27,525
Cultivators and weeders	12,274	16,871	22,230
Haying machinery ..	14,186	14,604	19,740
Harrowers, rollers, pulverizers and stalk cutters	11,723	13,302	16,652

Danish Electrical Industry Reaches All-Time Peak

WASHINGTON—Official statistics just issued show that the output of Denmark's electrical industry (exclusive of power machines) was at the highest level on record during 1939, says a report from the office of the American Commercial Attache, Copenhagen. With 1935, a peak year, equaling 100, the production index of this industry in the first 11 months of 1939 stood at 132, compared with 113 for 1938 and 110 for 1937.

At the beginning of 1939 there were in Denmark 116 electrical factories employing 5100 workers, which in 1938 produced electrical products valued at 40,730,000 crowns (\$7,860,000) and radio materials valued at 26,040,000 crowns (\$5,025,000). Included in the electrical products manufactured by the industry were circuit breakers, fuses, meters, batteries and incandescent lamps.

Aluminum Plants to Be Built in Sumatra

WASHINGTON—Plans for construction of bauxite and aluminum plants in Netherlands India are reported in dispatches to the Commerce Department. The necessary machinery has been ordered, delivery has been assured, and it is expected that a hydro-electric station and two plants will be constructed in North Sumatra, according to the report.

Small Steel Plant For Egypt is Studied

WASHINGTON—Egypt's Ministry of Commerce and Industry is represented in a Commerce Department dispatch from Cairo as considering the establishment under government supervision of a small steel mill to take advantage of the supply of scrap steel available in the country.

The report said that because substantial quantities of concrete reinforce-

ing bars and cotton baling wire are imported to Egypt, the Ministry is interested in becoming independent of outside sources for these products. Since the outbreak of the war, the Government has banned exportation of scrap iron, steel, nickel and copper.

Doehler Die Casting Co., Toledo, Ohio, has declared an interim dividend of 25c. a share on common stock payable April 18 to holders of record April 1. Last previous dividend was 20c. a share in April, 1938. Company operations have been at capacity and 1939 net profit was \$682,043, after all charges, and equal to \$2.41 a share on common.

LOOK

at its amazing simplicity



A-E-CO
LO-HED
Time-tested
HOISTS

Every once in a while you run across a machine whose logical simplicity makes you fairly whistle with admiration. That is the kind of approval a Lo-Hed Hoist inspires. Motor and drum are sensibly arranged on opposite sides of the I-Beam so that the weight of one balances the weight of the other; the hook is drawn up between motor and drum to obtain maximum headroom; and motor and drum are connected by highly efficient spur gearing. Take a look at the open-view of the Lo-Hed and we believe you'll say, "If I'd designed it myself, I couldn't have done better."

• This unique time-tested construction of the Lo-Hed Hoist gives you low headroom, and an unusually compact, strong, and well-balanced hoist. Remember it also has every worthwhile time-tested feature a hoist needs: Heavy duty hoist type motor, automatic lowering brake, anti-friction bearings, stub tooth spur gears, plow-steel cable, 100% positive automatic upper limit stop, dust and moisture-proof controller. (Construction varies slightly for classes of Lo-Heds.) Investigate Lo-Hed time-tested construction. Write today for the complete Lo-Hed Catalog shown below.



THERE'S A LO-HED ELECTRIC HOIST FOR EVERY PURPOSE

A—Bolt Suspension Type.
B—Plain Trolley Type.
C—Hand-Geared Type.
D—Motor Driven Trolley Type.
E—Cab-Controlled Type.

CAPACITIES FROM 1/4 to 12 TONS

AMERICAN ENGINEERING COMPANY

2410 ARAMINGO AVENUE, PHILADELPHIA, PA.

OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, HELE-SHAW FLUID POWER

Look in your classified telephone directory under "A-E-CO LO-HED HOISTS" for your nearest representative.

MAIL THIS COUPON NOW



AMERICAN ENGINEERING COMPANY
2410 Aramingo Avenue, Philadelphia, Pa.

☐ Please send me your 26 page complete catalog of Lo-Hed Hoists.
☐ Ask your representative to call.

Name

Company

Street Address

City State

..... (Please print plainly)

Progress Ends With Loss of Private Enterprise, Hook Says

CINCINNATI — When private enterprise, with its incentives to the individual to strive, save, and work, is basically altered, or lost, then all hope for continued progress and a higher standard of living is doomed, Charles R. Hook, president, American Rolling Mill Co., told more than 500 Iron and Steel Engineers here last week at the association's spring conference.

Delving into early industrial history when there was not as much cooperative effort between management and the man on the job, Mr. Hook, said: "Both had to learn that cooperation is profitable to all and when industry finally did realize an exchange of ideas and technical information as well as good industrial relations were good business, an era of unprecedented progress was born."

With inspection trips through the American Rolling Mill Co.'s plants at Middletown and Hamilton, Ohio, and the Andrews Steel Co. plants at Newport, Ky., technical discussions on slabbing mills, open-hearth improvements, strip mill finishing equipment, and present-day problems in operating wide strip mills featured the Iron and Steel Engineers Association meeting.

Slabbing Mill Described

Describing the electrical features of the Armco slabbing mill, A. F. Kenyon, Westinghouse Electric & Mfg. Co., said: "The arrangement of the reversing slabbing mill and of the 80-in. wide continuous hot strip mill at Armco's Middletown plant is different from the arrangement in most other plants producing wide strip. This slabbing mill is designed to produce slabs up to the maximum width of the strip which can be rolled in the strip mill, thus eliminating the broad side spreading stand and the slab squeezer from the strip mill layout and enabling the rolling of full weight coils over the entire range of strip widths."

With the vertical roll edging stand of the Middletown slabbing mill located 33 ft. from the main horizontal roll stand, Mr. Kenyon stated that this unusual arrangement imposes some special problems in the control and operation and the operator's pulpit is set into the motor room wall overlooking the table between the main and

edging mills, thus affording the greatest visibility.

Spark of Enthusiasm Needed

Listing recent improvements in open-hearth design and operation, L. F. Reinartz, manager, Armco's Mid-

dletown division, said: "After all this help has been made available, it is still up to the open-hearth superintendent to operate his shop. He alone can put the spark of enthusiasm into the working crew to get the best results from the improved equipment and materials that have been provided. The fact that so much progress has been made indicates the high degree of cooperation that has existed between the superintendent, his advisors, and the workmen."



with this EC&M CONTROLLER



OF COURSE, operators don't use cranes to crack walnuts but this statement expresses the fine degree of accuracy you have in an EC&M Magnetic Controller for hoist motions of cranes. Under any load condition, this controller is unequalled in its ability to permit short, accurate inching.

And equally as important is the ability of this controller to permit lowering of light loads or the empty hook at high speed . . . thereby permitting more trips per minute. Substantial power savings are also obtained with this EC&M Crane Controller.

For accuracy, low upkeep cost in controlling both large and small cranes, consult EC&M—specialists in crane control.

Magnetic Crane Controllers are described in Bulletin 920, Manual-type Controllers in Bulletins 960 and 980. Write for your copies.



HEAVY DUTY MOTOR CONTROL
FOR CRANES, MILL DRIVES AND
MACHINERY • BRAKES • LIMIT
STOPS • LIFTING MAGNETS AND
AUTOMATIC WELD TIMERS.

"Despite the fundamental advantages of the continuous rolling process, successful operation and quality product requires constant attention to details," G. D. Tranter, general superintendent, Armco's Middletown plant, told the Iron and Steel Engineers.

Enumerating specific requirements of quality and operation from the open-hearth on through to the wide strip mill, Mr. Tranter advised that systematic preventive maintenance and detailed inspection will do much to mini-

mize defects arising from the various units of mill equipment.

Exchange of Ideas Urged

"Maintenance of a standard practice system through proper metallurgical control results in a high degree of uniformity in a finished product," Mr. Tranter said, and added, placing considerable emphasis on cooperation. "The exchange of ideas and discussion of problems between the open-hearth, hot strip mill, and cold reduc-

tion units, results in correction of minor difficulties before serious quality difficulties arise on the inspection table or in the fabricating plants."

Other papers included "Strip Mill Finishing Equipment," by D. A. McArthur, chief engineer, Wean Engineering Co., Warren, Ohio, and "Ward-Leonard Control for Strip Mill Auxiliary Drives," by E. S. Murrah and H. W. Poole, steel mill section, Industrial Department, General Electric Co., Schenectady, N. Y.

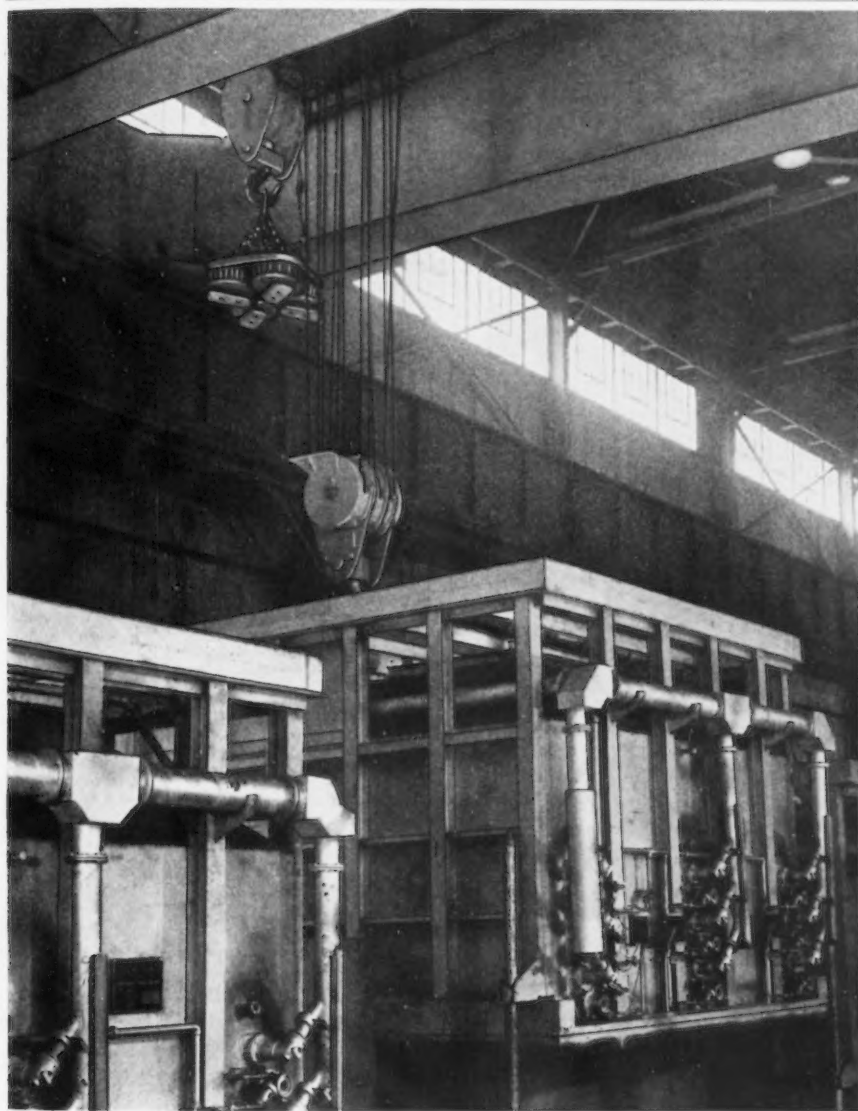
Management Society Conference April 11-12

CLEVELAND—The annual spring conference of the Society for the Advancement of Management will be held at the Hotel Statler, April 11 and 12, with experienced conference leaders presiding over each of the open forum discussions which will follow a speaker's presentation of a current management problem, according to P. L. Dildine, president of the local chapter.

Principal speakers and their subjects include: "Getting the Production Job Done," by Stuart Symington, president, Emerson Electric Mfg. Co., St. Louis; "Present Day Relations of Government and Business," by Joseph C. Hostetler, Cleveland attorney; "Keeping Production Costs in Line," by W. C. Wright, manager of supervisory training, Goodyear Tire & Rubber Co., Akron; "Making the Budget an Effective Management Tool," by P. K. Poulton, secretary-treasurer, Talon, Inc., Meadville, Pa.; "What is Ahead of Business in the U. S. A.," by Donald B. Gillies, vice-president, Republic Steel Corp.; "Pricing Your Product to Reach Your Market," by J. Frederick Dewhurst, Twentieth Century Fund, Inc., New York; "Multiple Management of Industry," by Charles P. McCormick, president, McCormick & Co., Baltimore; "Effectuating Public Relations Policies in Industry," by John W. Hill, Hill & Knowlton; and Whiting Williams, Cleveland.

Sloss Furnace Relined

BIRMINGHAM—Repairs to city furnace No. 2, Sloss Sheffield Steel & Iron Co., will cost \$100,000 it was announced by Benjamin Davis, vice-president. This is the second Sloss furnace to be relined within 90 days.



In placing the annealing-furnace-top in position, this steel mill crane is accurately regulated by EC&M Control. The auxiliary hook is equipped with an EC&M Type CSM Coil-handling Magnet.

THE ELECTRIC CONTROLLER & MFG. CO.

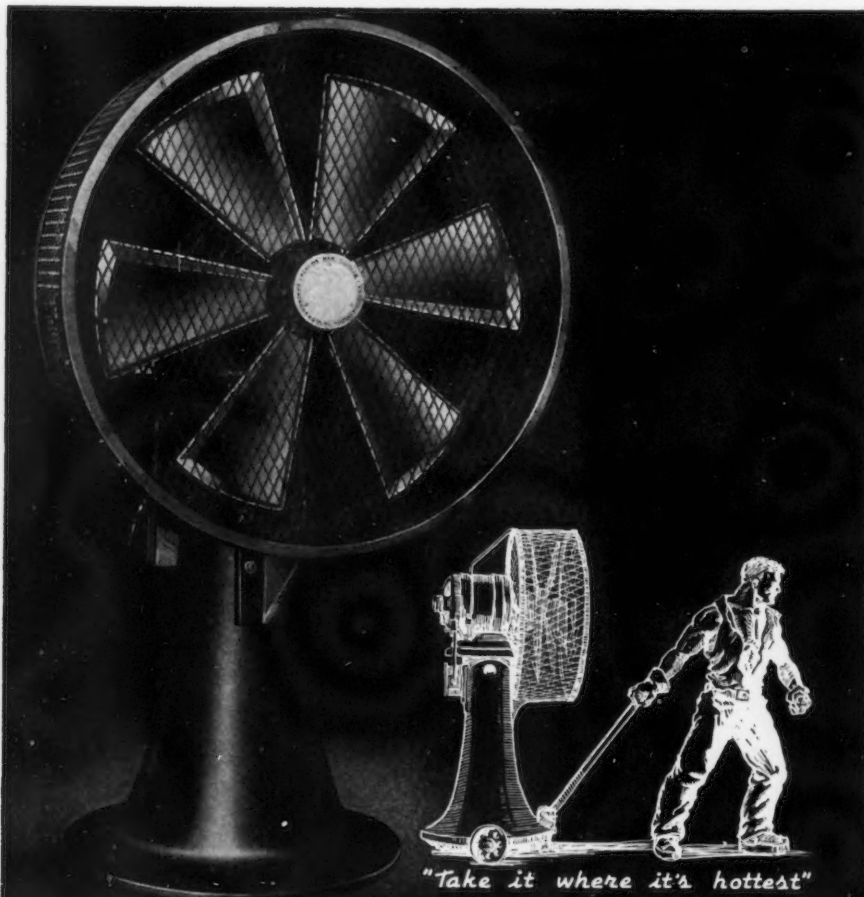
2698-A EAST 79th STREET, CLEVELAND, OHIO

India's Largest Steel Company to Expand

WASHINGTON—India's leading iron and steel company, according to reports to the Commerce Department, will expand facilities this year to meet defense and railroad requirements. One plant scheduled to begin operations by the Tata organization will manufacture wheels, axles and tires, locomotives and all types of rolling stock, the report said.

Other completed plans call for the

installation of a mill to roll billets suitable for several types of small and medium forgings, and an ingot mold foundry to increase output of castings. The report estimated that Tata's output for the year ended March 31, 1940, was 1,000,000 tons of steel ingot and 750,000 tons of finished steel. Pig iron capacity was estimated at 1,250,000 tons annually. The report said that under the extension program planned, the company's output is expected to reach 1,250,000 tons of steel ingots and 900,000 tons of finished steel.



Perkins Man Coolers create refreshing recirculation of air without chilling drafts.

Perkins Man Coolers help to maintain production schedules in the hottest places.

Perkins Man Coolers decrease labor turnover and help to make contented workers.

PERKINS MAN COOLERS ARE MADE IN OSCILLATING AND STATIONARY TYPES, BOTH PORTABLE.

B. F. PERKINS & SON, INC. HOLYOKE, MASS.

Engineers and Manufacturers

PERKINS MAN COOLERS

TRADE MARK REG. U.S. PAT. OFF.

Government Orders

WASHINGTON — Government contracts for iron and steel products as reported by the Labor Department's Public Contracts Division for the week ended March 30, totaled \$1,282,271. For the same period contracts for non-ferrous metals and alloys aggregated \$162,479; and contracts for machinery totaled \$441,202. Details follow:

Iron and Steel Products

Bethlehem Steel Co., San Francisco, Interior Reclamation, reinforcement bars	\$11,500
United States Steel Export Co., Washington, D. C., Panama Canal, sheet, galvanized	18,953
Truscon Steel Co., New York City, WPA, hangar doors	26,185
Edward G. Budd Mfg. Co., Philadelphia, WPA, steel trim	10,886
Keystone Steel & Wire Co., Peoria, Ill., War Engineers, wire fabric	115,500
Bethlehem Steel Co., Bethlehem, Pa., War Ordnance, forgings, liner	29,952
Bethlehem Steel Co., San Francisco, Interior Reclamation, reinforcement bars	48,300
Columbia Steel Co., San Francisco, Interior Reclamation, reinforcement bars	37,090
Judson Steel Corp., Oakland, Cal., Interior Reclamation, reinforcing bars	10,495
Midvale Co., Nicetown, Philadelphia, Navy Office of Secretary, gun forgings	308,697
Erie Forge Co., Erie, Pa., Navy Office of Secretary, housing forgings	54,575
Erie Forge Co., Erie, Pa., Navy Office of Secretary, housing forgings	72,766
Ellicott Machine Corp., Baltimore, Panama Canal, pump casings	14,340
William Scrimgeour, Washington, War QMC, tableware, steel	76,284
The Eastern Rolling Mill Co., Baltimore, Navy Yd. Norfolk, steel sheet	13,860
Western Can Co. (MJB Co., owners), San Francisco, Navy S&A, cans, paint	11,681
Pittsburgh Screw & Bolt Corp., Pittsburgh, Navy S&A, nuts and bolts	31,514
The Yale & Towne Mfg. Co., Stamford, Conn., Navy S&A, locks	11,547
Lukens Steel Co., Coatesville, Pa., Navy S&A, side plates	46,637
Standard Machinery Co., Providence, Navy S&A, roller paths	60,356
Gilbert & Barker Mfg. Co., Springfield, Mass., Navy S&A, steel bodies	12,814
John Wood Mfg. Co., Inc., Conshohocken, Pa., Navy S&A, steel packing boxes	168,431
Bethlehem Steel Co., Bethlehem, Pa., Navy S&A, mooring buoys	19,971
Walworth Co., New York City, Navy S&A, tube fittings	23,799
Bethlehem Steel Co., Bethlehem, Co., Navy S&A, steel bar	22,729
The Babcock & Wilcox Tube Co., Beaver Falls, Pa., Navy S&A, steel tubing	Indefinite
Ross Galvanizing Works, Inc., Brooklyn, Navy S&A, steel	23,401

Non-ferrous Metals and Alloys

Chase Brass & Copper Co., Inc., Waterbury, Conn., Panama Canal, brass pipe	\$23,398
American Brass Co., Waterbury, Conn., War Ordnance, cartridge cups	37,200
Caswell, Strauss & Co., Inc., New York, Navy S&A, tin, pig	90,679
Continental Can Co., Inc., New York, Navy S&A, cans	11,201

Machinery

Caterpillar Tractor Co., Peoria, Ill., Agriculture, Purchasing Sales & Traffic, patrol graders	\$15,720
Kearney & Trecker Corp., Milwaukee, War Ordnance, milling machines	13,211
Sauerman Bros., Inc., Chicago, War QMC, drag scraper equipment	26,982
Smith Engineering Works, Milwaukee, War QMC, gravel crushing equipment	15,670
Walworth Co., New York City, Navy Purchasing Office, composition valves	13,651

Victor R. Browning & Co., Inc., Willoughby, Ohio, Navy Yards and Docks, bridge crane	34,990
The Lodge & Shipley Machine Tool Co., Cincinnati, National Advisory Committee for Aeronautics, lathes ..	12,818
Fermutit Co., New York, War QMC, water softener units	15,947
Morton Mfg. Co., Muskegon Heights, Mich., Navy S&A, metal shaper ...	13,150
Tinius Olsen Testing Machine Co., Philadelphia, Navy S&A, testing machine	11,750
Consolidated Machine Tool Corp., Rochester, N. Y., Navy S&A, engine lathes	75,560
Henry Prentiss & Co., Inc., New York, Navy S&A, turret lathe	11,535
The Cooper-Bessemer Corp., Washington, Navy S&A, diesel engine ...	24,459
York Ice Machinery Corp., Philadelphia, Navy S&A, refrigerating plant	33,165
National Supply Co. (Superior Engine Division), Holmesburg, Philadelphia, Navy S&A, diesel engines	122,592

538,000 On Steel Industry Payrolls in February

EMPLOYMENT and payrolls of the steel industry declined in February, reflecting a lower rate of production and the short month. February figures were substantially above those of a year ago, however.

An average of 538,000 employees were at work in the industry during February, according to the American Iron and Steel Institute. By comparison, the number of steel industry employees averaged 556,000 in January and 453,000 in February 1939. Steel payrolls amounted to a total of \$70,847,000 in February, compared with \$82,827,000 in January and \$57,044,000 in February a year ago.

Wage-earning employees of the industry earned an average of 83.4c. an hour in February as against 83.5c. an hour in January and 82.7c. and hour in February, 1939.

The number of hours worked weekly by wage earners averaged 34.1 in February, compared with 37.1 in January and 33.5 in February of last year.

Falk Co. Adopts New Vacation Pay Plan

MILWAUKEE—The Falk Corp., through its president, Harold S. Falk, has sent a letter to its 1700 employees announcing a new vacation with pay plan covering both hourly and salaried workers. The vacations run from four days to two weeks and the plan includes provisions that vacation pay will be given any employee who might be laid off because of curtailed operations or an employee who might be unable to take a vacation due to illness or injury. In the event of death the company will give the vacation pay to the employee's beneficiary named in his group life insurance.

A. S. M. to Hear Lecture By Harvester Metallurgist

CHICAGO—The April meeting of the Chicago chapter, American Society for Metals, which will be held on April 11, will include a discussion of "Hot and Cold Heading Operations" by A. S. Jameson, works metallurgist for the West Pullman plant of International Harvester Co.

At this same meeting the nominating committee will recommend to the mem-

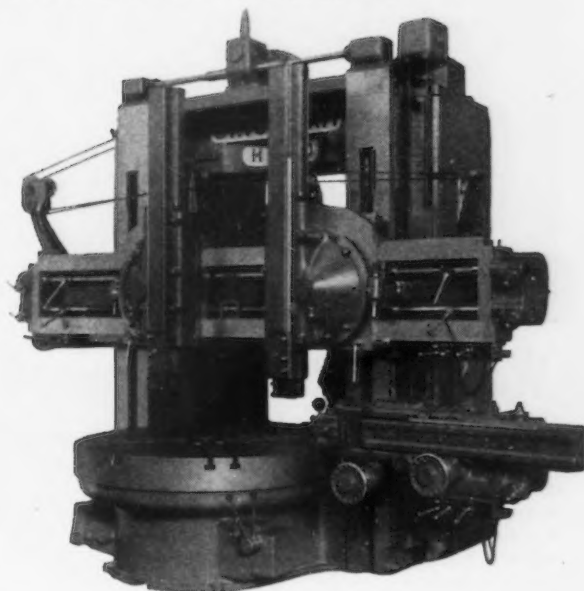
bers the following nominees for the year ending May 8, 1941: Chairman, R. G. Roshong, Lindberg Steel Treating Co.; vice-chairman, W. D. McMillan, International Harvester Co.; secretary-treasurer, E. A. Terwell, Driver-Harris Co., and assistant secretary, A. Hedstrom, Vanadium Alloys Steel Co.

Members of the chapter are invited on April 26 to make an inspection trip through the plant of the Electro-Motive Corp., La Grange, Ill.

Cincinnati

SPIRAL BEVEL GEARED

HYPRO VERTICAL BORING MILLS



Engineered to combine speed, flexibility and ease of control with power, rigidity and accuracy to meet the requirements of today.

Designed for:

1. Centralized Pendant Station Control which provides operation of the entire machine from the operator's position.
2. Individual feed and rapid traverse boxes with independent Rapid Traverse Motors for each head, making it possible to control each head independent of the other.
3. Automatic lubrication provided to all feed boxes, table drive, heads and saddles requiring no attention on the part of the operator.

In these competitive times, you need this kind of equipment. Full particulars sent upon written request.

Sizes—52", 62", 72", 84", 100", 120", 144".

PLANERS • PLANER MILLERS • BORING MILLS
THE CINCINNATI PLANER CO.
CINCINNATI, OHIO

International Harvester Adopts Profit-Sharing Plan

CHICAGO—International Harvester Co. has devised a plan whereby the hazards of unemployment and old age for about 50,000 employees in America and Canada will be reduced by means of savings and profit sharing.

Under the plan, which will cost the company \$1,000,000 yearly, an individual account will be created for every employee who participates. Those with more than one and less

than three years service will participate in a limited manner, and may deposit up to 10 per cent of their salary or wages and receive interest from the company. Employees with more than three years service will receive the full benefits of the plan. Into their accounts will go money derived from three sources:

1. The employee voluntarily may save up to 10 per cent of his salary or wages.
2. In this case, the company will

match his savings on a 50 per cent basis up to a maximum of 5 per cent of his salary or wages, plus interest on both the savings and matching credits.

3. Twenty-five per cent of all earnings over \$3 a share on the common stock will be distributed to employees, in proportion to individual salaries or wages.

Grob Brothers Sponsors Show at Cleveland

GROB BROTHERS, Grafton, Wis., has announced that it is sponsoring an exhibit of production machinery, machine tools and accessory equipment at the Cleveland Auditorium, June 25 to 29. The company hopes to make this an annual affair, and has chosen Cleveland as the site of its first show because of its location in the heart of the manufacturing district of the country and because the Public Auditorium contains exhibition halls that meet every requirement for both large and small equipment.

This exhibit is not to be confused with the Machine Tool Show which is conducted at the Cleveland Auditorium at irregular intervals by the National Machine Tool Builders Association. Last September, Grob Brothers had organized a group of independent exhibitors at the Cleveland Armory, but withdrew their arrangements when the Machine Tool Show was cancelled because of the sudden rush of foreign orders.

Industrial Building Up 97% in First Quarter

CONSTRUCTION awards for industrial buildings placed in the first three months of the present year were 97 per cent above the volume of the comparable period of 1939, *Engineering News-Record* reports. The value of all heavy construction awards, public and private, in the first quarter was \$642,741,000, or 20 per cent below the corresponding quarter of a year ago. Publicly financed construction for the quarter totaled \$426,915,000, a decrease of 28 per cent below the first three months of 1939, while all types of privately financed building amounted to \$215,826,000, as compared with \$208,713,000 in the 1938 quarter.

On a geographic basis, only two sections of the country reported increases in the first quarter of the current year, as compared with the first three months of 1939. These two sections, the South and Far West, were 6 and 10 per cent respectively higher.

A GREAT NEW IDEA in Welding Equipment!



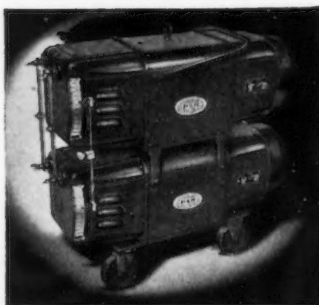
Welding Range Down to 15 Amps

Amazing - - - the only machine of its kind...brings new ease...new flexibility...new economy to all types and classes of welding! Each unit provides a welding range from 15 to 200 amps. A simple parallel hook-up provides two or more separate services (multiple service) for individual operators or a combined higher amperage service for one operator.

Unequalled Arc Performance With One Simple Arc

The Compact, square frame design accentuates the advantages of the P&H-Hansen welding generator in providing the finest known arc characteristics. Single control for one, two or more units is provided by the P&H "Multiple Shifter." Current selection is simplified and foolproof.

A production line, precision built—saves you money. Fine workmanship is combined with the practical economies of mass production to make this welder surprisingly moderate in cost.



Single or multiple units are available with either stationary or portable mountings.

Send for literature—write for Bulletin K-28 giving complete information on this new and remarkable welder and welding service.

General offices: 4401 West National Avenue, Milwaukee, Wisconsin

HARNISCHFEGER

CORPORATION

ARC WELDERS • EXCAVATORS • ELECTRIC CRANES



MOTORS • HOISTS • WELDING ELECTRODES

Bennett Company to Make Steel Containers in South

CONSTRUCTION of the new Bennett steel products plant on a seven and one-half acre tract of land, near the Mississippi River bridge in New Orleans, will be completed and in operation about April 1. The new company, formed by S. A. Bennett, former president of Wilson & Bennett, will manufacture steel drums and containers, employing up to 100 men.

Officers of the new company include S. A. Bennett, president; Maumus Claverie, vice-president; John Gifford, secretary and treasurer. Superintendent of the new plant will be A. Claverie, working in conjunction with John Devlin and L. Ganet.

New Mill for Rolling Dowmetal to be Built

MIDLAND, MICH.—A large rolling mill for the production of sheet Dowmetal will be erected shortly by the Dow Chemical Co., according to Willard H. Dow, president and general manager. Building and equipment, costing approximately \$500,000, will increase the Midland capacity for sheet Dowmetal at least 50 per cent. A building 300 x 100 ft. will house the present equipment and new equipment including a four-high rolling mill.

New Building Planned for Federal Machine & Welder

WARREN, OHIO—Federal Machine & Welder Co. has let the contract for a new engineering building with 8000 sq. ft. of floor space. Part will be used for engineering offices, the remainder for research and metallurgical laboratories.

Seaboard Steel Products Expands its Business

SEABOARD Steel Products Corp., 205 East 42nd Street, New York, has taken larger space in that building for expansion and addition of new departments, including an enlargement of the export department to handle structural steel, sheets, stainless steel and tool steel. Louis Baum, who was for many years with the Truscon Steel Co., is president of the company, which in domestic trade specializes in sales of plain steel and fabricated steel products to the construction industry.

Cleveland-Cliffs Ore Shipments Gain 166%

CLEVELAND — Cleveland-Cliffs Iron Co. reports for 1939 net profits of \$3,378,394, or \$6.93 a preferred share, on which accumulated unpaid dividends as of Dec. 31 last amounted to \$29.16 per share. In 1938 profit was \$755,759 or \$1.55 a preferred share.

Ore shipments from properties operated or managed by the company or

leased to others amounted to 4,782,146 tons, a gain of 166 per cent over the 1,794,187 tons shipped in 1938. Ore inventories were cut by about 400,000 tons.

Tonnages shipped by the coal department amounted to 3,485,001 in 1939 as compared with 2,726,949 in 1938. Vessel department earnings were reported to have been satisfactory while earnings of Cliffs Power & Light Co., power subsidiary, improved.



Heft and Stamina for heavy handling jobs

MEETING shock with strength is the best answer to "weighty" handling problems. In addition to brawn, Logan engineers have built into heavy-duty Conveyor Rolls design elements which insure long life and low maintenance expense: Logan bearings, rolls, and mountings combine ruggedness with simplicity. A minimum of parts. All-steel seals. Outer shield stationary, does not protrude beyond end of roll. Hexagon shafts. Request today, catalogs on heavy-duty, or normal-duty conveyors, as required, or ask for nearest engineer to call.

LOGAN CO. Inc., 545 Cabel, Louisville, Ky.

Logan Conveyors

PUT FLOW INTO PRODUCTION

Canadian War Contracts Include Additional Mine Sweepers

TORONTO—While new business in the Canadian steel markets showed some tapering off during the past week, orders for diversified lines of materials in fairly large volume are pending. Primary steel producers report heavy backlogs and officials state that business booked and in prospect indicate capacity production

rates for the remainder of the year and much longer if the European war continues.

Finance Minister Ralston stated that for the current fiscal year the Canadian Government will require \$500,000,000 for war purposes. War contracts continue to appear both from the Canadian and British Governments, with

principal contracts now being placed by the Canadian War Supply Board being for airplanes and equipment for the British Empire Air Training Plan. Demand for steel in connection with production of guns and munitions also is increasing and Canadian mills are said to be considerably behind in deliveries to meet demands and on new orders for sheets, plates and bars delivery dates are more than three months into the future.

Consumers in need of steel for immediate consumption are placing large orders in the United States and it is expected that imports from across the line during the next three months will reach record proportions.

H. J. Kelley, vice-president of Dominion Steel & Coal Corp., Sydney, N. S., states that the large rail contract from the South African Railway and Harbour Administration, totaling 57,000 tons divided between his company and Algoma Steel Corp., Sault Ste. Marie, Ontario, will provide additional work for the rail mill, which otherwise might have been idle. Delivery will start the latter part of the year. He also stated that the large additions and improvements to the Sydney works are nearing completion. One of the large new open hearth furnaces has been installed and put into operation, and work on the second 100-ton furnace is being rushed. When all new units are operating the plant will reach 50,000 tons of steel a month against a high monthly production record of 41,000 tons.

More Shipbuilding Work

Contracts for anti-submarine and mine sweeper ships continue to be placed. One of the latest to receive contracts for mine sweepers is the newly formed Dufferin Ship Building Co., Ltd., which received orders totaling about \$3,500,000. The company is headed by James Franceschini, 415 Lake Shore Road, Mimico, Toronto, Ont., president, and W. A. Kingsland, 322 Inglewood Drive, Toronto, formerly general manager, central region of Canadian National Railways, vice-president. The new company has taken over the old Dominion Shipbuilding Co.'s plant at Toronto, which will be equipped and work will be started without delay. The contract calls for delivery this year of two all-steel mine-sweepers. Machinery for the plant and plates for the ships, Mr. Kingsland states, have been ordered.

In addition to the \$10,000,000 rolling stock orders in prospect from the Canadian Pacific Railway Co., approximately \$4,000,000 will be spent by the company on construction and other projects including: Replacement and



CARLINE BRACKET — Used for connection between side posts and roof carlines in body frame construction of present type trailers.

Buses, trailers, railroad cars, and all transportation units, earn dividends through light weight construction. This is made possible by using high

strength, corrosion resistance stampings.

To witness:—These brackets made by Parish are of .050" Ga. and 3/16" High Tensile Steel. They bring sturdy endurance, increased pay-load capacity to trailers.

Parish engineers can bring an added value to your product. Let us show you how.



PARISH PRESSED STEEL CO.

READING, PENNA.

Pacific Coast Representative
F. Somers Peterson Co.,
57 California St.,
San Francisco, California



SPRING BRACKET — For trailer, made of several pressed steel plates welded to form the assembly shown. Lighter and Stronger.

enlargement of structures, \$166,000; additions and betterment to stations, etc., \$185,325; miscellaneous roadway betterment, \$1,590,000; replacement of rails, \$565,000; rock ballasting, \$514,000; additions and improvements to shop machinery, \$213,700; additions to terminals and side track equipment, \$77,000; improvements and additions to hotels, \$24,000; additions to communication facilities, \$256,000.

Orders placed by the War Supply Board, Ottawa, during the week had total value of \$1,457,624 of which \$823,700 was with aircraft firms. Orders were placed as follows:

Aircraft supplies—Canadian Pratt & Whitney Aircraft Co., Longueuil, Que., \$812,750; British Air Ministry, \$11,000.

Electrical equipment — International Harvester Co., Ltd., Ottawa, \$19,203.

Construction—Newton Construction Co., Sherbrooke, Que., for work at No. 3 elementary flying school, Windsor Mills, Que., \$80,562; Coast Construction Co., Vancouver, B. C., for work at R.C.A.F. station, Ucluelet, B. C., \$53,873; Smith Brothers & Wilson, Ltd., for materials and construction at R.C.A.F. station, Jericho Beach, Vancouver, B. C., \$8,285.

Improvement in Structural Steel

Structural Steel fabricators report sharp improvement in business with the majority carrying more orders on books than for several years past. In addition, new booking continues on an expanding scale with several thousands of tons pending. Orders in prospect include: 600 tons for normal school and convent for R. C. Parish, Amos, Que., Jules Caron, 324 Bonaventure St., Three Rivers, Que., architect; 600 tons for sanitarium for Hotel Dieu, Sherbrooke, Que., L. N. Audet, 32 Wellington Street North, architect; 300 tons for building for Sacred Heart Sisters, St. Joseph, N. B., Louis N. Audet, 32 Wellington Street North, Sherbrooke, Que., architect; 400 tons for school for R. C. School Commission, St. Hyacinthe, Que., R. Rene Richer, 242 Girouard Street, architect; 300 tons for school for R. C. School Commission, Cap de la Madeleine, Que., Amyot, Bouchard and Rinfet, 105 Mountain Hill, Quebec City, architect; 500 tons for hospital at Vancouver, B. C., for Dominion Department of Public Works, Ottawa, J. M. Somerville, secretary; 300 tons for school for Surrey School Board, Surrey, B. C., Harold Cullerne, 325 Howe Street, Vancouver, architect.

Structural awards include: 500 tons to Dominion Bridge Co., Ltd., 1139 Shaw Street, for 10-story addition to office for Ontario Hydroelectric Commission, Toronto; 300 tons to Dominion Bridge Co., 1139 Shaw Street, Toronto, for addition to plant of Anacanda American Brass, Ltd., New To-

ronto, Ont.; 500 tons to Horton Steel Works, Ltd., 660 St. Catharine Street West, Montreal, for construction of arsenal buildings at Valcartier, Que.; 300 tons to London Structural Steel Co., Ltd., Burslem Avenue, London, Ont., for bridge at London.

\$150,000 Warehouse for G-F

YOUNGSTOWN, OHIO—General Fireproofing Co. will expend \$150,000 for building a warehouse for storing steel.

Ryan Backlog \$1,680,000

SAN DIEGO, Cal.—Five manufacturing contracts totaling more than \$300,000 have been received recently by Ryan Aeronautical Co., it has been announced by T. Claude Ryan, president. The backlog of orders now stands at \$1,680,000. The new contracts call for the manufacture of Ryan manifold exhaust systems incorporating special ball and socket joints. The new contracts were placed by Douglas Aircraft Co. and Lockheed Aircraft Corp.

SPIRAL WOUND BRUSHES

for Continuous Strip Production

Cut finishing costs—speed production!

YOU can—easily—with the new Pittsburgh Plate Spiral Wound Brushes. These Spiral Wound Brushes may be had in various fills—horsehair, nickel silver wire and tampico. Consult with our representative. He will gladly work with you in developing Spiral Wound Brushes to meet your particular production requirements. Write or phone for further information.

**PITTSBURGH
PLATE GLASS COMPANY**
Brush Division • Baltimore, Md.



Italy to Expand Iron, Steel Capacity

ROME, ITALY—Italy's pig iron production will be increased by the construction of two new blast furnaces and modernization of five or six of its present furnaces. There will also be an increase in the capacity of steel plants in North and Central Italy. Machinery and equipment will be supplied largely by

Germany. Italian production will be raised to about 2,800,000 tons of pig iron and 4,000,000 tons of steel ingots annually.

The scrap that will be required to attain a steel production of 4,000,000 tons a year (approximately Italy's present consumption) will be purchased largely in the United States. But Italy is shifting from open-hearth to bessemer production, which will reduce its requirements of scrap.

Meanwhile, Italy has made some

progress in reducing her dependence on foreign sources for scrap. In 1935 only 41 per cent of the scrap consumed was obtained in Italy, but last year domestic production of scrap accounted for 56 per cent of the amount consumed, in addition to which 4 or 5 per cent was obtained from her colonies; thus not more than 40 per cent had to be obtained from foreign countries.

New Directory of Michigan Manufacturers Published

LISTING 6000 manufacturers of all kinds, the second edition of "The Directory of Michigan Manufacturers" is announced by the Michigan Manufacturer & Financial Record of Detroit. Bound in flexible imitation leather, this 520-page volume is divided into three sections on varicolored paper—alphabetical, geographical and products.

The alphabetical section shows names, addresses, products manufactured, executive personnel, types of management, capitalization and employment figures. The geographical section includes 385 Michigan cities, towns and villages with population shown. The products section contains more than 1350 product classifications.

G-E Orders \$97,490,047 In First Quarter

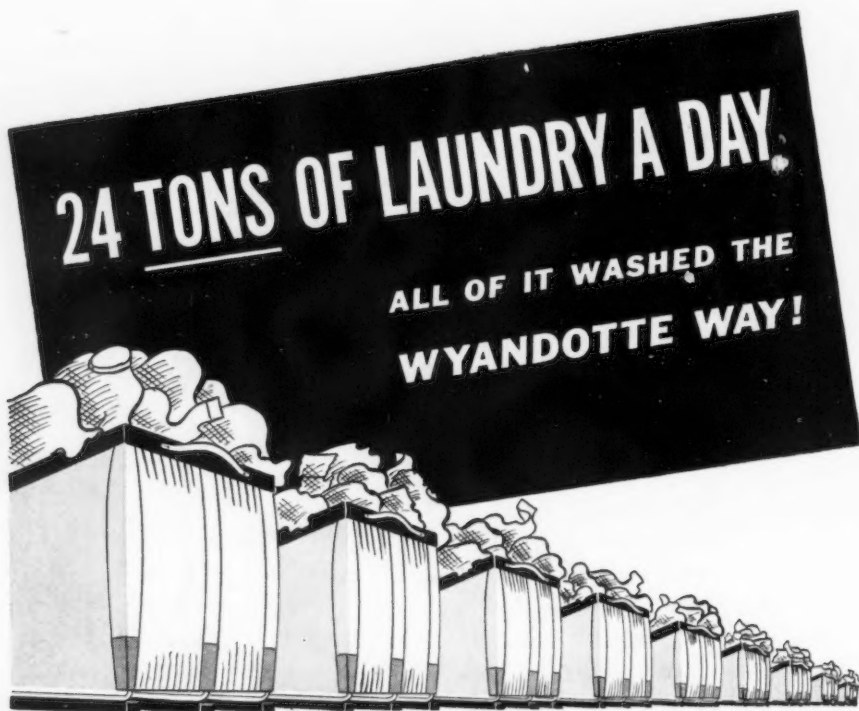
ORDERS received by General Electric Co. in the first quarter of 1940 amounted to \$97,490,047, compared with \$86,882,953 for the corresponding period in 1939, an increase of 12 per cent, Charles E. Wilson, president, announced.

Beale to Visit South

SIR LOUIS BEALE, of the British purchasing commission, is expected to visit Birmingham shortly. He will be a guest of Thomas W. Martin, president, Alabama Power Co. A dinner will be given by district manufacturing executives.

Scrap Group Disbands

THE Wisconsin Scrap Iron Dealers Association at a recent meeting in Milwaukee decided to dissolve that organization and to apply to the Institute of Scrap Iron and Steel for a charter as a chapter of the national body.



WYANDOTTE likes big jobs! Whether it's a job of laundry production or a job of metal cleaning production, we're equipped to deliver results and keep the cleaning line moving.

Here's an example: A big laundry uses Wyandotte to wash 96 thousand pieces a day! That's 24 tons of work a day, 13 million pounds a year! A man-sized job, done by Wyandotte at minimum cost!

Just as the Wyandotte Laundry Service Representative solved this laundry's problem with a Wyandotte product, your local Wyandotte Industrial Representative can help you to determine which of the many Wyandotte metal cleaners will do your job best. Simply write to The J. B. Ford Sales Co., Wyandotte, Michigan.

Wyandotte
SERVICE REPRESENTATIVES IN 88 CITIES

THE J. B. FORD SALES CO.
WYANDOTTE MICH.

TRADE NOTES

Contract Welders, Inc., 2545 East 79th Street, Cleveland, has changed its name to **Contract Engineering Corp.**, with no change in personnel or management.

A. C. Wiebe, molding equipment representative for the **F. J. Stokes Machine Co.**, Philadelphia, has moved to new offices at 103 Park Avenue, New York. He handles Standard toggle-type molding presses, automatic molding machines and Stokes preform presses.

Granite City Steel Co., Granite City, Ill., had a net profit of \$347,940 for 1939 after all charges, or 91c. a share compared with a net loss of \$330,231 for the preceding year.

Glebel Machine Tool Co., Inc., New York, has moved its Hartford, Conn., office to 152 Temple Street, New Haven, Conn. J. A. Graham and S. J. Williamson will make that office their headquarters.

Lea Mfg. Co., Waterbury, Conn., has been appointed New England distributor for the **Aminco-Brenner Magne-Gage**, manufactured by the **American Instrument Co.**, Silver Spring, Md. The **Magne-Gage** is an instrument for accurately and rapidly measuring local thicknesses of metallic or organic coatings on metal surfaces without destroying or injuring the coating or the base metal. The **Lea** company has also been appointed distributor in New England for the line of soft rubber polishing wheels manufactured by **West Co., Inc.**, Philadelphia.

The Pittsburgh office of **Frick-Reid Supply Corp.** has been moved to 305 Ross Street, in the 311 Ross Street building, from the former headquarters on the North Side of Pittsburgh.

J-B Sales Engineering Co., New Haven, Conn., has been appointed Connecticut engineering representative for the **Worm Gear Division** of the **De Laval Steam Turbine Co.**, Trenton, N. J., and announces the addition of **Frank Griesing** to its staff.

A new sales office of **General Electric Co.**'s plastic department was established in Rochester, N. Y., on April 1, under direction of **A. G. Davidson, Jr.**, as sales representative. This is the ninth sales office to be established by the department, and the second during this year, according to **G. H. Shill**, manager of the plastics department.

Cleveland Tramrail Erie Co., distributors in Erie, Pa., and surrounding territory for **Cleveland Tramrail** overhead materials handling equipment, has moved to 1731 Oxford Street, Erie. **H. M. Nelson** is manager of this office.

The **Century Electric Co.** held an "Old Timers' Party" March 23 at the **Missouri Athletic Club** in St. Louis for those who had been with the organization 20 years or more. One hundred and fifty-five attended.

Metal Stamping & Mfg. Co., 16816 Waterloo Road, Cleveland, will change its name, effective May 1, to **Morrison Products, Inc.**

Jones & Lamson Machine Co., Springfield, Vt., last year made a net profit of \$843,833 after all charges including Federal taxes, which compares with a net profit of \$248,689 in 1938. Sales last year aggregated \$4,978,082, as against \$2,911,761 in 1938. At the close of 1939 current assets were \$2,720,710, including \$533,343 cash, while current liabilities were \$428,791, leaving a net working capital of \$1,809,163. Inventories were \$1,616,745, as against \$1,274,989 at the close of 1938.

McKee Company Reports Foreign Inquiries Gaining

CLEVELAND—Arthur G. McKee Co., engineers and contractors, now has a number of active foreign inquiries covering fairly sizable projects, mostly in the oil refinery field, according to the annual report to stockholders issued recently. The company's volume of domestic inquiries is larger than it has been for the past

several years, said Arthur G. McKee, president.

The company's net profit for the year 1939 after all charges, was \$210,812, compared with \$612,771 for the year 1938. As of Dec. 31, 1939, current assets totaled \$1,447,082 with \$664,860 in cash and current liabilities inclusive of a provision of \$43,300 for estimated Federal taxes on income, aggregated \$471,927.

DIVIDENDS DECLARED

once a month

with
SUN HEAVY DUTY LUBRICANTS

\$560.00 MINIMUM MONTHLY SAVINGS ON ONE OPERATION ALONE!
Month after month savings roll up . . . thousands of dollars over a year's time! Not only savings over former lubricants used . . . but bearing losses cut to a minimum. Another record smashing performance when one large mill changed their lubrication setup and switched to **SUN Heavy Duty LUBRICANTS**.
Possibly new records can be established in your mill . . . savings discovered . . . production improved . . . when **SUN H. D. LUBRICANTS** are put on the job. Call in a **SUN Technical Representative**—let him aid you in meeting today's peak demands at lower cost. Write . . .
SUN OIL COMPANY, Philadelphia, Pa.

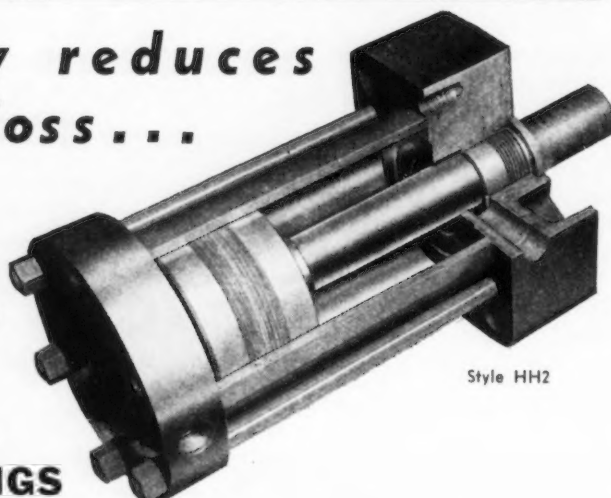
PETROLEUM PRODUCTS FOR ALL INDUSTRIES

SUN OILS

Photo Courtesy John P. Mudd

**Notably reduces
power loss...**

(T-J)
**HYDRAULIC
CYLINDER
PISTONS
are SEALED
with PACKINGS**



Style HH2

On test these cylinders show a 95% average efficiency for pressures from 500 to 2000 pounds per square inch. This applies to "blank" end pressures, that is, the "push" stroke of the cylinder. "Rod" end pressure stroke efficiency is from two to three points lower (because of the added sealing friction of the piston rod packings), but only until the pressure reaches 1000 pounds per square inch where the 95% efficiency is attained.

Catalog H-37 reports on additional construction features, service characteristics and gives complete cylinder specifications. Your copy (which also includes important usable data on hydraulic installations) will be sent promptly. Address The Tomkins-Johnson Co., 628 N. Mechanic Street, Jackson, Michigan.

this is a **TOMKINS-JOHNSON** *product*

STANDARD S. A. E. ALLOY STEELS IN STOCK

For those who prefer standard numbered steels we have

2315	3140	X4130 (Aircraft)
4615	3145	X4340 (Aircraft)
	X4340	
3130	6145	4140
3135	6150	4150

For those who wish to take advantage of constant metallurgical improvement and development long before they are incorporated in S.A.E. standards, or where close selection of material for analysis, grain size, control and quality is desired, we offer

ALLOY



GRADES

THE HY-TEN OF TODAY IS THE STANDARD STEEL OF TOMORROW

"A" IX	"B" 2	"B" 4	"B" 43
"A" 15	"B" 3X	"B" 5	"M" Temper

Rounds
Squares
Flats

BARS and FORGINGS

Hexagons
Octagons

Warehouses
CAMBRIDGE
CLEVELAND
CINCINNATI
CHICAGO

WHELOCK, LOVEJOY & CO., INC.

Send for Data Sheets

Warehouses
DETROIT
NEWARK
BUFFALO

PERSON

COL. JAMES G. COWLING has been appointed special representative of Allegheny Ludlum Steel Corp., Pittsburgh, in its relations with Federal Government agencies. Formerly he was assistant to the executive vice-president, and director of purchases of J. I. Case Co. and later general manager of the J. I. Case Co. motor works. Col. Cowling, after resigning from the Case company, became vice-president and general manager of the Federal Pressed Steel Corp. and later became a deputy administrator of the NRA, in Washington, later being located in the Chicago area as regional director.

♦ ♦ ♦

EARL E. THULIN has been appointed vice-president and general manager of sales of the Duff-Norton Mfg. Co., Pittsburgh. For the present he will make his headquarters at the Peoples Gas Building, Chicago, moving to the general offices in Pittsburgh later in the year. W. I. FLOYD has been made assistant general manager of sales, in addition to continuing in his present capacity of assistant to the president. C. N. THULIN continues in Chicago as vice-president and will act in a sales executive capacity as a special representative in all territories.

♦ ♦ ♦

A. E. WALKER has been elected president, National Supply Co., Pittsburgh. Mr. Walker, a graduate of the



COL. JAMES G. COWLING, special representative of Allegheny Ludlum Steel Corp. in its relations with Federal Government agencies.

SONALS . . .

University of Michigan, was connected with Republic Steel Corp. and its predecessor the Republic Iron & Steel Co. for 21 years, serving as general manager of sales from 1928 to 1936. He also was president of Truscon Steel Co. From January, 1937, to April, 1939, he was executive vice-president of Pittsburgh Steel Co.

On April 1, 1939, Mr. Walker was made vice-president and director of National Supply Co. as well as president of Spang Chalfant, Inc.



ERNEST E. SWARTSWELTER, Youngstown broker, has been elected chairman and president of Aetna - Standard Engineering Co., Youngstown, succeeding JEROME R. GEORGE. Five new directors are C. G. OHLSON, vice-president; CHARLES F. SMITH; FRED TOD, of Youngstown; and W. F. THOMPSON and A. M. FRIEND, of New York. They succeed Mr. George, K. B. BOWMAN, senior vice-president, and F. J. GRIFFITHS, Massillon, and fill two new directorships. Board members retained are Mr. Swartswelter, L. L. DALBEY, secretary-treasurer; E. D. HOPPER and T. LAMAR JACKSON, attorney.



HUGH G. GIBSON has been appointed general superintendent in charge of all operations of the McKeesport tin plate division of McKeesport Tin Plate Corp. Mr. Gibson has

been with McKeesport Tin Plate since 1927, when he held the position of master mechanic, and has since been chief engineer, assistant superintendent, and acting general superintendent. Prior to his connections with this company, he was construction engineer for the Aetna Foundry & Machine Co. His first connection with the tin plate industry was in 1923 when he joined the engineering department of American Sheet & Tin Plate Co., New Castle, Pa.



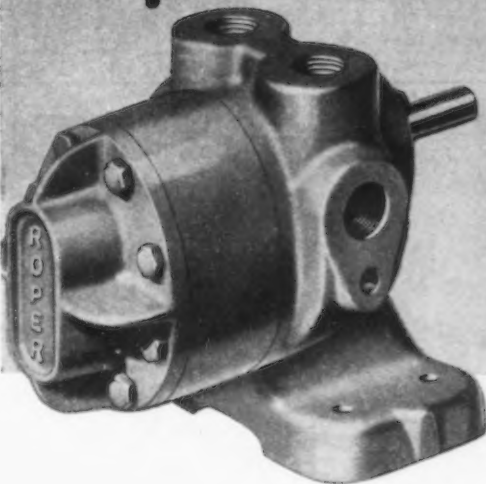

HUGH A. GALT has retired as vice-president of Pittsburgh Plate Glass

Co., Pittsburgh, after more than 40 years' service. He has also resigned as president of the Southern Alkali Corp. and the Columbia Alkali Corp., subsidiaries of Pittsburgh Plate Glass, and as general manager of the Columbia Chemical division and Columbia cement plant of the plate glass company. Mr. Galt will continue his activities as a director of Pittsburgh Plate Glass Co., Cleveland & Pittsburgh Railroad, and First Central Trust Co., Akron, Ohio.



JOSEPH BRENNAN, formerly associated with the Weatherhead Co., Cleve-

A *New* IMPROVED LINE OF ROPER *Rotary* PUMPS

**TO MEET *Your* NEEDS
MORE EFFICIENTLY**

CAPACITIES . . . 1 to 1000 G. P. M.

PRESSURES . . . Up to 1000 lbs. per sq. inch

MOUNTINGS AND DRIVES . . . 21 Different Types to meet your requirements


SPEEDS Up to 1800 R. P. M.

BEARINGS . . . Sleeve or Roller Bearings

PACKING BOXES . . Three different types

GEARS . . . Spiral, Spur or Herringbone

PIPING Eight arrangements



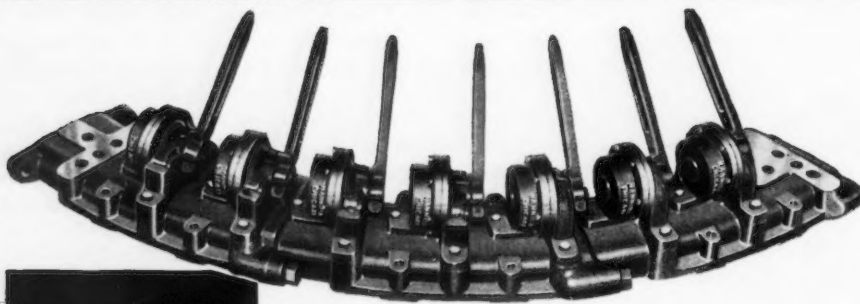
Write for the New
ROPER
Catalog 941

with illustrations, cutaway views, drawings, dimension and pumping capacity tables, and complete information on the new improved Roper line.



EARLE E. THULIN, new vice-president and general manager of sales of the Duff-Norton Mfg. Co.

GEO. D. ROPER CORP. ROCKFORD, ILLINOIS



SIMPLER CONTROL OF AIR OR HYDRAULIC CYLINDERS

● Concentrating control at one point not only simplifies handling of air or hydraulic equipment but simplifies piping too. Hannifin Manifold Valves have the simple disc-type design that does away with packing, avoids leakage and packing maintenance. Positive and accurate control is assured.

Manifold valves are built in several types to suit individual needs. Also hand or foot operated, spring return, rotary, electric, and special models. Write for Valve Bulletin 34-A.

HANNIFIN MANUFACTURING COMPANY
621-631 South Kolmar Avenue • Chicago, Illinois

ENGINEERS • DESIGNERS • MANUFACTURERS • Pneumatic and Hydraulic Production Tool Equipment

HANNIFIN *"Packless"* VALVES AIR CONTROL

Reminder
Over 10,000 types and sizes
of nails, brads and staples
Noted for accuracy of gauges,
heads, points and lengths
Regular and special finishes—
packaged for every class of
trade
Special nails designed
to meet special needs
of manufacturers

CONTINENTAL
CONTINENTAL STEEL CORPORATION
KOKOMO, INDIANA
Plants at Kokomo, Indianapolis, Canton

OPEN HEARTH STEEL
WIRE • Bright
Basic, Annealed,
KONIK, Special
Manufacturers,
Nails, Barb Wire,
Fence.
SHEETS • Black,
Galvanized, Roof-
ing and Siding.

land, has been elected executive vice-president and general manager of Bender Body Co., Elyria, Ohio.

HERMAN DE BOER, formerly in charge of school bus sales for the company, is now sales manager over all divisions and JOSEPH BENDER, SR., is factory superintendent.

♦ ♦ ♦

LEWIS F. HERRON, metallurgist, James H. Herron Co., Cleveland, has been elected chairman of the Cleveland chapter of American Society for Metals. GEORGE J. HALES, Cleveland Electric Illuminating Co., is vice-chairman; CARL E. SWARTZ, metallurgist, Cleveland Graphite Bronze Co., is treasurer. A. E. R. PETERKA, technical assistant to the president and advertising manager, Lamson & Sessions Co., is now chapter secretary.

♦ ♦ ♦

DAVID E. JACKMAN has retired as treasurer of Firth-Sterling Steel Co., McKeesport, Pa., but will continue as a director of the company. Mr. Jackman, 78, has been treasurer of the company since 1911. H. R. HUEMME, formerly assistant treasurer, has been elected treasurer.

♦ ♦ ♦

W. J. CAMERON of the Ford Motor Co., Detroit, will be the speaker at a meeting of the Wisconsin chapter of the American Foundrymen's Association April 19 in the Schroeder Hotel, Milwaukee.

♦ ♦ ♦

HOWARD M. ZOERB, chief engineer of the crusher division of Nordberg Mfg. Co., Milwaukee, who has returned from a five months' trip in Central and South America during which time he flew 11,000 miles and traveled another 7000 by train, boat and horseback, declares that these countries can be expected to buy more goods in the United States as long as their source of supply is cut off by the European war.

♦ ♦ ♦

C. L. AUSTIN has been elected a director of the Blaw-Knox Co., Pittsburgh, to fill a vacancy created by the recent resignation of J. THEODORE GODDARD, of London, Eng. Mr. Goddard, however, retains his position as board chairman of Blaw-Knox Ltd., English subsidiary. Mr. Austin is a vice-president and director of the Mellon Securities Corp. All officers were reelected.

♦ ♦ ♦

CECIL M. KNIGHTS, who has been identified in a sales capacity with the Hanson - Van Winkle - Munting Co., Matawan, N. J., since 1929, has been made manager of the Detroit office of the company. Up to October, 1939, he

had been identified with the Chicago office. Mr. Knights has had a long experience in the electroplating industry.



PHIL CARROLL, JR., for the past six years operating vice-president of Dyer Engineers, Cleveland, has resigned to establish his own practice with Minster & Co., New York, business consultants. Mr. Carroll will specialize in personnel problems.



LOUIS KUEHN, whose retirement as chairman of the board of the Milcor Steel Co. was announced in these columns on March 14.

EUGENE CALDWELL, general manager of the Wrought Washer Mfg. Co., Milwaukee, spoke on "How to Reduce Taxes Through Accounting Methods" before the last meeting of the Milwaukee Society of Accountants.



G. S. CRANE, vice-president of Cutler-Hammer, Inc., Milwaukee, who has returned from an extended business trip through Mexico, reports that the national elections to be held in July are slowing down business and that the oil seizures have harmed international trade. Another factor contributing toward slower business has been the loss of trade due to the European war. Mr. Crane reports tourist trade, diverted to Mexico by the war, to be the best in the history of the country.



W. W. COLEMAN, president, Bucyrus-Erie Co., Milwaukee, has been elected to the board of directors of the J. I. Case Co., Racine, Wis.



VAUGHN H. BROWN, Milwaukee newspaper man, has been named man-

TWIN



PLANTS

INSURE

SPRING DELIVERIES



Meeting the exacting demands of leading mass-production industries—successfully—is a matter of record here. Either or both B-G-R plants are ready to plunge into your spring requirements—with engineering and design assistance—or just fast production and delivery.

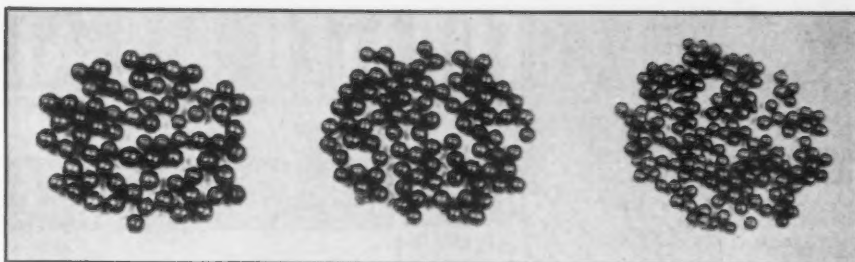
Each B-G-R plant is similarly equipped with modern machines, heat treating equipment, laboratories—and what's equally important—a goodly supply of spring materials in many sizes and kinds.

It's good insurance for your assembly lines to use B-G-R service in the form of springs, stampings, wire forms

BARNES-GIBSON-RAYMOND

DETROIT PLANT DIVISION OF ASSOCIATED SPRING CORP. COOK PLANT

DETROIT, MICHIGAN ← TWO PLANTS → ANN ARBOR, MICHIGAN



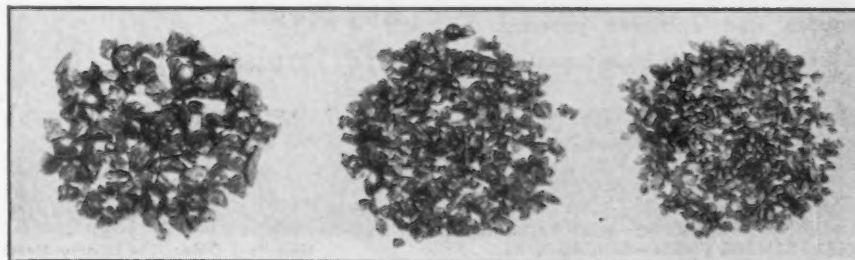
IN the period of one year we have built up a very large business with our Heat-Treated Steel Shot and Heat-Treated Steel Grit. This was accomplished on purely a quality product. Our many hundreds of customers, nationally known Concerns, are using our Shot and Grit, and saving money every day, blasting faster with less wear of abrasive. Our heat treating insures toughness and strength, fast blasting and long wearing. Try it in your machine and prove the truthfulness of these statements.

We never compromise with quality.

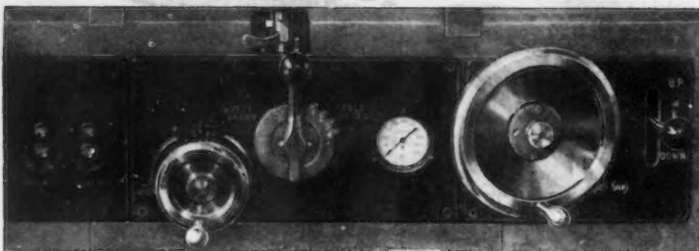
A ton or a carload. Will match any size.

HARRISON ABRASIVE CORPORATION

MANCHESTER, NEW HAMPSHIRE

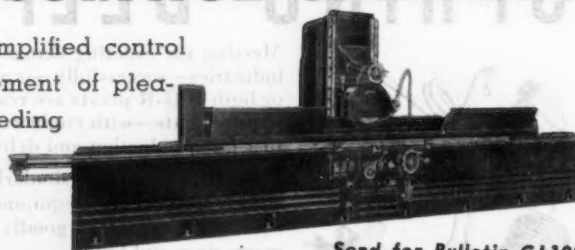


GRAND RAPIDS



Model 'F' SURFACE GRINDERS

have a convenient, simplified control panel that puts an element of pleasure in the task of speeding production.



Send for Bulletin GL108

GALLMEYER & LIVINGSTON CO.

200 STRAIGHT AVE., S.W.

GRAND RAPIDS

MICHIGAN

PERFORATED METAL

INDUSTRIAL and

ORNAMENTAL

INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furniture, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns.

H & K workmanship is unsurpassed.

Any Metal
Any Perforation

The
Harrington & King
PERFORATING CO.

5657 FILLMORE STREET—CHICAGO, ILL.

New York Office, 114 Liberty Street

ager of the newly established south side Milwaukee branch of the Kalamazoo Stove & Furnace Co., Kalamazoo, Mich. ♦ ♦ ♦

RUSSELL R. MORGAN has been named sales manager of Cleveland Rock Drill Co., Cleveland, succeeding the late George H. Hall, who also served as secretary. Mr. Morgan has been treasurer, assistant secretary and assistant sales manager. No announcement has been made concerning the secretaryship. ♦ ♦ ♦

JOHN G. BELL has joined the Cleveland sales department of Jones & Laughlin Steel Corp., Pittsburgh. Formerly he was on the Cleveland staff of Youngstown Sheet & Tube Co. ♦ ♦ ♦

G. C. HUTCHINSON, treasurer of Pioneer Steamship Co., Cleveland, was elected to the executive committee and to the board of directors of the Lake Carriers Association, Cleveland, and C. F. PLATZ, vice-president of Bradley Transportation Co., was also elected to the board, at a recent meeting. ♦ ♦ ♦

DEWEY M. DOW, who joined the Air-Way Electric Appliance Corp., Toledo, as tool and die maker when the company was started in 1920, has been named vice-president in charge of production for the company. He is credited with more than 60 patents on vacuum cleaners and equipment for manufacturing them. ♦ ♦ ♦

JAMES E. TURNER, formerly associated with the Allis-Chalmers Co. and the Pioneer Mfg. Co., has been made purchasing agent of the Atlantic Steel Co., Atlanta, Ga., succeeding PERRY JACKSON. Mr. Turner is a native of Alabama and is a graduate of Alabama Polytechnic Institute. ♦ ♦ ♦

HAYES PARSONS, who has represented the Speeder Machinery Co. and the Link-Belt Speeder Corp. in Seattle, for the past several years, has been appointed sales manager for the Link-Belt Speeder Corp., Chicago. Before joining the old Speeder Machinery Co. in 1924, he served as Seattle branch manager for the Austin-Western Co. ♦ ♦ ♦

R. M. PAXTON, JR., New York district manager of the Jessop Steel Co., Washington, Pa., has been appointed manager of the newly-established export office of the company at 2 Rector Street. He will continue in charge of domestic business at the same address.

... OBITUARY ...

WALTER F. KEENAN, JR., director and vice-president in charge of engineering of Foster Wheeler Corp., New York, died at his home in Pelham Manor, N. Y., on March 18, aged 54 years. He was graduated from the University of Pennsylvania in 1908 and joined the Power Specialty Co. in 1911, of which he later became chief engineer. For the past two years he was president of the American Boiler Manufacturers Association.

♦ ♦ ♦

A. W. VENNEMA, mechanical superintendent of the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., died at his home in Ridgewood, N. J., on March 23, aged 53 years. He had been associated with the company since his graduation from Stevens Institute of Technology in 1909.

♦ ♦ ♦

JOHN S. HERZOG, for 25 years president of Simpson Foundry & Engineering Co., Newark, Ohio, died April 1 in La Jolla, Cal., aged 60 years. He was formerly connected with General Electric Co. and was in charge of the Holophane Co., a branch of General Electric, at Newark, before the company moved.

♦ ♦ ♦

JOHN A. FREDRIKSON, owner of the Fredrikson Pattern Shop, Detroit, died March 28. Born in Sweden 68 years ago, Mr. Fredrikson had been in business in Detroit for 22 years.

♦ ♦ ♦

ROBERT R. DUNN, vice-president, General American Transportation Corp., Chicago, died of pneumonia last week in Miami Beach, Fla. Mr. Dunn had had 21 years of service with the corporation, beginning as a timekeeper in a subsidiary company. In 1935, after holding various executive positions in other subsidiaries, he was elected a vice-president of the corporation.

♦ ♦ ♦

HENDERSON N. WHITE, founder and president of the H. N. White Co., Cleveland, died on March 26.

♦ ♦ ♦

JOHN R. HAMILTON, former president of the Automatic Sprinkler Corp. of America, Youngstown, died in Cleveland on April 4, aged 66 years.

♦ ♦ ♦

HARRY ALBERT VOGLESANG, a retired chemist, who for 42 years was employed by the American Steel Foundries Co., died April 3 in Sharon, Pa., aged 65 years.

IRVING S. BILTY, sales engineer for the Landis Tool Co., Waynesboro, Pa., died March 1 in a Milwaukee hospital after an illness of two months. He was a native of Milwaukee and made his home there. He was 48 years old.

♦ ♦ ♦

W. A. KRASSETT, chairman of the board of the Cramer-Krasselt Co., Milwaukee advertising agency, died March 2 in a Milwaukee hospital at the age of 66 years from a heart attack. Mr. Krasselt was one of the founders of the Audit Bureau of Cir-

ulation, was active in developing the Better Business Bureau and his company was a charter member of the American Association of Advertising Agencies. He also held directorships in several industrial and financial firms.

♦ ♦ ♦

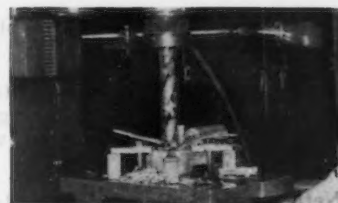
CHARLES REID BOGGS, vice-president and general manager of the Simplex Wire & Cable Co., died at his home in Wabon, Mass., April 1. He was born in Nashville, Tenn., 56 years ago and was graduated from the Massachusetts Institute of Technology.

Another Repeat Order FOR A CLEEREMAN JIG BORER

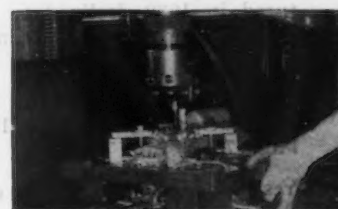
... this time from I-T-E
Circuit Breaker Company



Range of work
and accuracy
are features of
the Cleereman
Jig Borer.



Cleereman Jig Borer drilling
large pivot hole in circuit
breaker crank arm.



Accurate boring operation on
air blast breaker part showing
versatility of the Cleereman
Jig Borer.

Address
Bryant Machinery & Engineering Company
400 W. Madison St., Chicago, Ill., U. S. A.
Sales Division of
Cleereman Machine Tool Company
Green Bay, Wis.

★ WRITE FOR
CATALOG NO. 200

CLEEREMAN

DRILLING MACHINES and JIG BORERS

... THE NEWS IN BRIEF ...

Automobile production may be stepped up as a result of heavy spring sales.—Page 60.

Final ruling on steel wage minimum now up to Supreme Court; decision expected by June 3.—Page 64.

Three-year extension of reciprocal trade agreement program is approved by Senate.—Page 66.

Inland Steel Co. freighters open navigation on Great Lakes.—Page 66.

Supreme Court to decide whether anti-trust laws apply to labor unions.—Page 68.

Dr. R. R. Sayers is appointed acting director of Bureau of Mines, succeeding John W. Finch.—Page 70.

Inventions and new scientific discoveries to create jobs are No. 1 need of nation, Charles F. Kettering says.—Page 72.

House Labor Committee pushes its plan revising Wagner Law, enlarging NLRB to five members, aiding craft unions.—Page 72.

NLRB revises policy for run-off elections.—Page 74.

Egypt reported considering establishment of plant for making reinforcing bars and baling wire.—Page 75.

Netherlands India reported planning construction of aluminum plants.—Page 75.

Value of farm equipment manufactured in 1939 declined to \$469,356,740 from \$490,013,369 in 1938.—Page 75.

Output of Denmark's electrical industry reaches new peak in 1939.—Page 75.

Progress is ended when system of private enterprise is altered or lost, Charles R. Hook, president, American Rolling Mill Co., tells Association of Iron and Steel Engineers.—Page 77.

Management Society conference, April 11-12.—Page 77.

Sloss Sheffield Steel & Iron Co. relines second blast furnace.—Page 77.

Government orders for iron and steel products total \$1,282,271 for week ended March 30.—Page 78.

Tata, India's largest steel company, to expand facilities to meet defense and railroad requirements.—Page 78.

538,000 on steel industry payrolls in February.—Page 79.

Falk Co. announces new vacation with pay plan for its 1700 employees.—Page 79.

American Society for Metals, Chicago chapter, to hear paper on hot and cold heading operations by International Harvester Co. metallurgist.—Page 79.

SECTIONS INDEX

Personals	86
Obituary	91
Steel Ingot Production	101
Summary of the Week	102
Comparison of Prices	103
Markets	104
Fabricated Steel	108
Non-ferrous Market	109
Scrap Market and Prices	110
Finished Iron & Steel	112
Pig Iron & Raw Material Prices ..	113
Warehouse Prices	114
Machine Tool Activity	116
Plant Expansion & Equipment ...	118

MEETINGS

April 10 to 12—International Acetylene Association, annual convention, Milwaukee.

April 11 and 12—Galvanizers Committee of American Zinc Institute, annual spring meeting, Pittsburgh.

April 22 to 24—Triple mill supply convention, Dallas, Tex. Sponsors are American Supply and Machinery Manufacturers' Association, Southern Supply and Machinery Distributors' Association and National Supply and Machinery Distributors' Association.

April 25 and 26—Concrete Reinforcing Steel Institute, 16th annual meeting, Hot Springs, Va.

May 6 to 10—American Foundrymen's Association, annual meeting and equipment exhibition, Chicago.

May 7 and 8—Society of Automotive Engineers, national production meeting, Hartford.

May 20 to 22—American Gear Manufacturers Association, annual meeting, Asheville, N. C.

May 23—American Iron and Steel Institute, annual meeting, New York.

June 3 to 6—Annual international convention and Inform-a-Show, National Association of Purchasing Agents, Cincinnati.

Grob Brothers, Grafton, Wis., plans exhibit of production machinery and machine tools at Cleveland, June 25-29.—Page 80.

Profit-sharing plan adopted for International Harvester Co. employees.—Page 80.

Construction awards for industrial buildings in first quarter are 97 per cent above comparable period of 1939.—Page 80.

Cleveland-Cliffs Iron Co. reports 166 per cent increase in ore shipments during 1939.—Page 81.

New building is planned by Federal Machine & Welder Co., Warren, Ohio.—Page 81.

Seaboard Steel Products expand its business.—Page 81.

New Bennett plant for making steel containers is erected at New Orleans.—Page 81.

Mill for rolling Dowmetal to be erected shortly at Midland, Mich.—Page 81.

Canadian war contracts include additional order for mine sweepers totaling \$3,500,000.—Page 82.

General Fireproofing Co. to build \$150,000 steel warehouse.—Page 83.

Ryan Aeronautical Co. reports order backlog of \$1,680,000.—Page 83.

Wisconsin Scrap Iron Dealers Association disbands, will seek Institute of Scrap Iron and Steel charter.—Page 84.

General Electric Co.'s first quarter orders \$97,490,047 against \$86,882,953 in like period last year.—Page 84.

Italy's pig iron capacity to be increased by construction of two new blast furnaces, modernization of other stacks.—Page 84.

New directory of Michigan manufacturers covers companies in 385 cities, towns, and villages.—Page 84.

Sir Louis Beale, of British Purchasing Commission, to visit Birmingham.—Page 84.

Arthur G. McKee Co. reports numerous foreign inquiries, particularly in oil refinery field.—Page 85.

Foundrymen, open-hearth plant operators discuss electric steel melting problems at Battelle Institute conference.—Page 100.

Toledo Industrial Peace board shows record of 23 labor disputes settled in 1939.—Page 116.



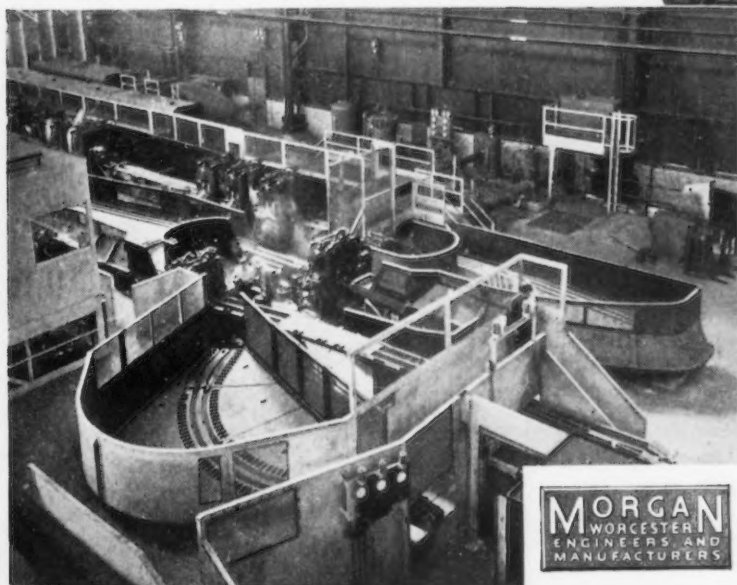
Wide World
Photos, Inc.

ITS SPAN OF LIFE IS A WIRE

MILE upon mile, the shuttle moves across the sky—its thread a slender steel wire. And from the huge cables thus formed another bridge takes its place among the wonders of the world!

What's back of it? Steel wire, drawn from rod, rolled with uniform precision on Morgan Continuous Rolling Mills; rolled to exact standards—proving itself in multiple tests that detect the slightest imperfection.

Morgan Rolling Mills are built to fit production schedules demanding the *highest* speed and the *highest* degree of uniformity.



Thousands of miles of steel wire make up the gigantic suspension cables of the San Francisco-Oakland Bay and the George Washington bridges.

When spinning is completed, a powerful radial jack compresses the strands into a single huge cable which is wrapped with wire.

**MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS**

MORGAN

**CONTINUOUS
ROLLING MILLS**

**ROD • STRIP • SKELP
MERCHANT SHAPES R-70**

TNEC Hearings Are Not Aimed to Aid Machine Tax, O'Mahoney Says

WASHINGTON — Temporary National Economic Committee hearings this week are not intended to support Senator O'Mahoney's recently introduced bill to provide a system of rewards and contributions for the purpose of stimulating employment in private industry, the Wyoming senator said.

"The Karsten-CIO bill to tax the machine was introduced to focus attention on the problem of men and machines," Senator O'Mahoney said. He added: "I would be the last person in the world willingly to propose anything which would retard the amazing development of the United States. It is essential, however, that serious and concentrated study be given to the perfectly obvious fact that technological advance and the increase of unemployment have at least been simultaneous. That the subject has been under consideration by many widely diverse elements of society has been made clear to me by the unusually numerous and vigorous responses to the introduction of my bill. The committee hearings will give an opportunity to coordinate and develop public thought on the problem."

For its spokesman at the hearings, the steel industry chose Charles R. Hook, president, American Rolling Mill Co., Middletown, Ohio. Steel labor from the viewpoint of his organization was heard through Philip Murray, president of the Steel Workers' Organizing Committee. The steel

industry was selected as the second one to present its case, being preceded by the automobile industry. Spokesmen for the latter were C. F. Kettering, research engineer, General Motors Corp., and Edsel Ford, president, Ford Motor Co. The labor witness for the automobile industry was R. J. Thomas, president of the United Automobile Workers of America.

The hearings are under the direction of Dr. H. Dewey Anderson, economic consultant to the committee, who is acting as counsel and Dr. T. J. Kreps, economic adviser to the committee. Doctor Kreps opened the hearings with the presentation of their overall purposes as claimed by sponsors. He was followed by Director Watson Davis, of Science Service, and William Green, president, American Federation of Labor.

In a preliminary statement, Senator O'Mahoney said that the whole problem of technological change, including the development of the use of machines, and the effect of both on employment and production, will be carefully analyzed. To this end, he said that he had invited what "may properly be called one of the greatest galaxy of scientific and industrial leaders ever assembled by a Congressional or governmental committee." He said it had been assembled for the purpose of securing as completely well-rounded presentation as possible "of all sides of this most interesting and important of all our economic and

industrial problems." The advance of technology, he stated, will be discussed not only from the point of view of experts in science and industry, but also from the point of view of labor and the business executive.

"In other words," Senator O'Mahoney said, "both theory and practice will be examined."

The specific case studies cover the automobile, steel, coal, railroads, textiles, communications, office techniques and appliances, agriculture and vocational and consumers' education.

"The great importance of this subject is everywhere recognized," continued Senator O'Mahoney. "Without modern technology, mass production would not be possible; it is technology which has enabled industry to organize into great concentrated units of production and distribution. Technology has created many new industries and has provided many new opportunities for labor, though at the same time it has unquestionably displaced many workers."

"The committee plans to study seriously the impact of technology in all its implications, what it means in terms of unemployment, of unused capital, of the effective organization of our nation's resources. We enter these hearings with no pre-judgment of the problem; rather, we seek to learn from industrial and labor leaders in those fields where technology is a major problem, what is taking place, what is likely to occur next, and what policy the nation can and should adopt to insure the greatest economic and social benefit from the wise use of our advancing technology."

British Steel Mills Increase Activity

LONDON—Extremely active conditions remain the rule throughout the British iron and steel trades; outputs being limited only by the capacity of the mills and by the availability of raw materials. In regard to the latter the recent price advances have had a helpful effect, and steel scrap in particular is now coming forward more readily, although makers would welcome more ample supplies.

A further improvement in raw material supplies is expected to be brought

about by increased arrivals of Continental and semi-products. France is, of course, also a heavy purchaser of Belgium and Luxemburg material at the present time, so that imports from these sources are to some extent limited.

Due to the steady expansion of business there is now an extended delivery date for new orders. For some materials delivery cannot be offered under 20 weeks, while in light plates certain mills are committed for even longer periods.

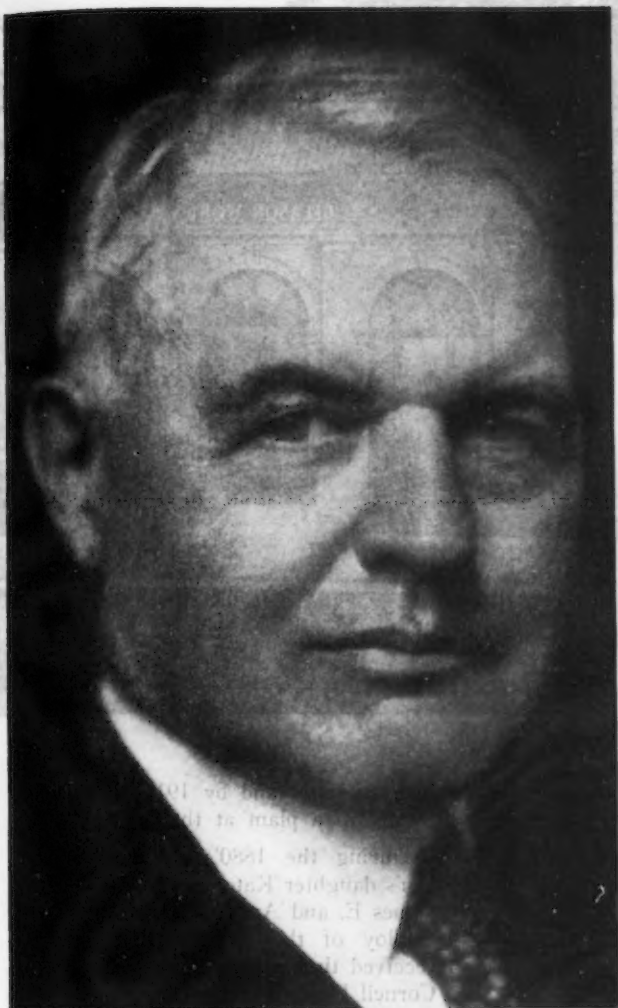
Pig iron remains in strong demand and makers are pressing for larger ore supplies to keep pace with the quantity of work in hand. There is also growing activity at most of the

engineering establishments, the marine shops especially having an abnormal run of orders.

A moderate amount of export trade is still being handled, but the Iron and Steel Control is restricting licenses for those materials which are most in arrears for domestic delivery.

No heavy industry is more active than shipbuilding, and specifications for steel plates, sections, etc., are coming to the steel mills in great quantities. As berths are being utilized again almost as soon as vacated and as all yards have practically an unlimited amount of work ahead, arrangements with the steel mills practically take the form of running contracts.

GLEASON WORKS CELEBRATES 75TH ANNIVERSARY



JAMES E. GLEASON, president, The Gleason Works.

PROMINENT machine tool builders and other industrialists gathered in Rochester, N. Y., April 6, to participate in the 75th anniversary of the Gleason Works, founded in 1865 by William Gleason.

Inspection of the plant, in full operation, in the morning by more than 300 of the invited guests was followed by a luncheon at the Oak Hill Country Club which featured brief addresses by a number of machine tool builders and by men prominent in the business and civic affairs of Rochester. In the evening the 1600 Gleason employees with members of their families or with friends, to the number of 7000, also visited the plant, inspecting a number of key production set-ups. Facilities for dancing were provided in the plant dining room and a band concert was given in the shipping department. A feature of this employee participation in the diamond jubilee celebration was the presentation to

James E. Gleason, president, of a large silver cup.

Old Morse Instrument Used

A feature of the Oak Hill Country Club luncheon was the receiving of congratulatory messages on an old Morse telegraph instrument and on the most recently developed teleprinter, the latter receiving messages and cables from cities throughout the United States, from London and Birmingham, England, and for Belgium, France, Sweden, and Germany. The old Morse instrument was of the type in use when Western Union was founded in Rochester 12 years before the founding of the Gleason Works. It was operated by C. W. Stafford, telegrapher for more than 50 years. The message received by him was addressed to James E. Gleason, and read: "Your employees take pride with you in the 75 march-of-progress-years in the building of bevel gear machinery."

E. Blakeney Gleason, vice-president and treasurer, and grandson of the founder of the company, presided at the luncheon. Brief addresses were made by Edward Bausch, chairman of the board, Bausch & Lomb Optical Co.; Tell Berna, general manager, National Machine Tool Builders Association; Clayton R. Burt, president, Pratt & Whitney division, Niles-Bement-Pond Co.; also by, Frederick V. Geier, president, Cincinnati Milling Machine Co., and first vice-president of the National Machine Tool Builders Association, Samuel B. Dicker, Mayor of Rochester; Jules Lassau, Fenwick Freres, Paris, France, and E. G. Miner, chairman of the board, Pfau-ler Co., and president board of trustees, University of Rochester. In addition to Mr. Lassau, representatives of the company's foreign agents included Gino Grandelli, Milan, Italy, and Francis O. Blackwell, Ataka & Co., Ltd., New York.

In opening the luncheon, James E.

Gleason was greeted with an ovation. "I would like to invite you all to the 100th anniversary of the Gleason Works," he said in part. "In the next 25 years we will have changed the entire machinery equipment three times and it is doubtful if many of the present buildings will be standing. Obsolescence and unemployment go hand and hand," he continued, "and the hope of the future as I see it is in new things. The automobile and airplane industry have led the way and kept us busy. Due to their far-sighted methods the machine tool industry has developed as it has."

"Boys In Blue" Menu

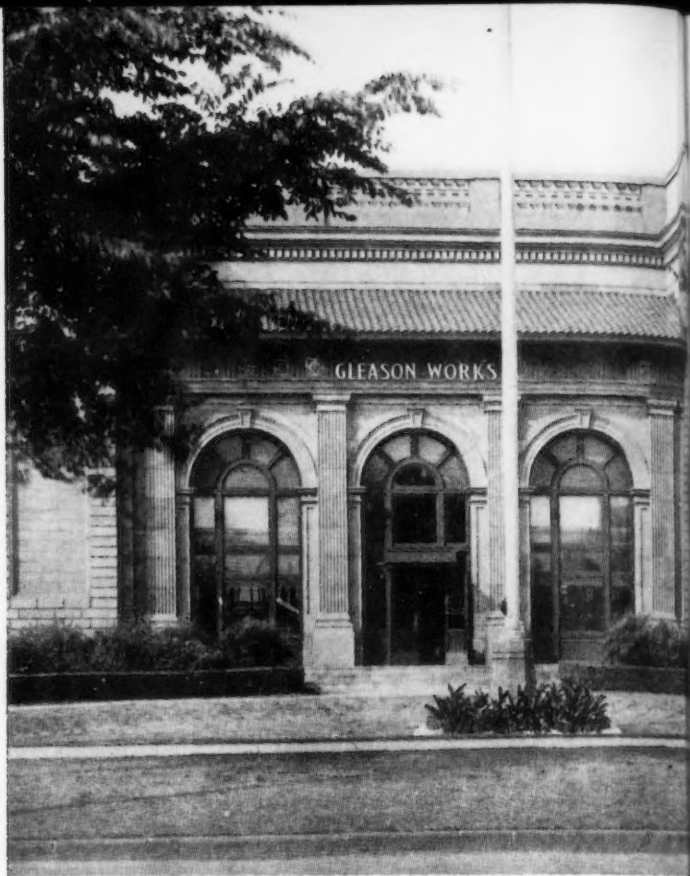
The menu of the luncheon was taken from one served the "Boys of Union Blue," Oct. 16, 1864, at the Osburn House, Rochester.

The plant inspection in the morning covered more than 18 departments, from foundry to assembly, and was in groups escorted by employees. The departments were fully manned and in production operation. A large amount of modern production equipment was to be seen, Gleason bevel and hypoid gear generators, as well as cutters and accessory equipment for testing, burnishing, hardening, lapping and grinding straight bevel, spiral bevel and hypoid gears was also to be seen, both in actual production and in process of manufacture.

In addition to interesting exhibits of patent papers and early models, full size machines of early vintage were shown. One was a 36-in. bevel gear planer built in 1878 and used in industry for more than 50 years. This is of the same type as the first Gleason machine, which after 40 years of use was presented to the Ford Museum at Dearborn, Mich. A 15-in. Gleason spiral bevel gear generator, one of the first, was also on view.

An attractive brochure: "Gleason, 1865-1940," distributed during the diamond jubilee celebration, chronicles and illustrates the beginning and growth of the company. William Gleason, the founder, was born April 4, 1836. He received his formal education in Rochester and acquired his early training as a mechanic in the machine shops of Asa R. Swift and I. Angell & Son, both of Rochester, and later, at the Colt Armory, Hartford, Conn. The original Gleason factory was on the banks of the Genesee River, and was run by water power. For many years the company built a general line of machine tools, with particular emphasis on engine lathes and planers. In 1874

THE main portico of the attractive executive offices.



Mr. Gleason developed a machine for cutting the teeth of straight bevel gears. This machine, a bevel gear planer of a form-copying type, was patented in 1876. Its basic principles are used even today in the largest sizes of the company's bevel gear cutting machine.

Original Plant Outgrown

Because of an increasing demand for cut bevel gears, the company at the turn of the century decided to devote all its efforts to the manufacture of machinery for producing bevel gears. The bicycle era helped materially to influence this decision, for the chainless bicycle required bevel drive gears and machines to cut them. In 1905 the company had outgrown its

original plant and by 1911 was completely in a plant at the present site.

During the 1880's William Gleason's daughter Kate, and his two sons, James E. and Andrew C., entered the employ of the company. All three received their engineering training at Cornell University.

In 1905 James E. Gleason developed what is known as the two-tool bevel gear generator, a marked advance in the art of bevel gear cutting. It found an immediate market in the infant automobile industry, contributing to the production of better cars at lower prices. In 1913 he developed a process and tool for cutting the teeth of spiral bevel gears that for the first time made such gears com-

FINAL assembly, inspection and shipping floor.



Let Young Inventors Have Chance To Make Jobs For All, Kettering Tells TNEC

WASHINGTON—Testifying Tuesday before the Temporary National Economic Committee, Charles F. Kettering, vice-president of General Motors Corp., in charge of research, said that there are not enough new things to provide sufficient jobs for all of the people who want work. The future, he declared, holds a treasure of great and good things for all to share and of enough jobs for all to do. This was Dr. Kettering's answer to those who claim that unemployment is produced by too many inventions.

Asserting that there is a need for young Marconis, young Bells and young Edisons, Dr. Kettering said that if given the opportunity of free enterprise, they will contribute freely. In every industry, those existing and those to come, it was stated, their improvements will demonstrate clearly "that what we have today is not enough or good enough." This was the reason, he told the committee, that, "with all conviction I say that the future is boundless."

Great Discoveries Are Coming

Turning to his own particular field, Dr. Kettering predicted a greater improvement in automotive transportation in the next 10 years than that of the past 10 years. He pointed out that scores of research projects are now under way in the industries which make automobiles, trucks, buses, tractors, airplanes and diesel locomotives. This, he added, is also true in every one of the industries which

supply materials for the automotive industry, such as petroleum, rubber, steel, fabrics, chemicals, etc. Dr. Kettering stated that success in only a small percentage of the jobs now in mind will give American workmen thousands of new jobs and will increase the value of the transportation dollar more than can now be realized. It was declared that of the millions who earn a living in the automotive transportation business only about 10 per cent are unemployed in making the vehicle.

Automobiles and airplanes of tomorrow, Dr. Kettering said, are being built right now in secluded laboratories by specialists in fuels, metals, ceramics, rubber, plastics, by designers of engines, by petroleum technologists, by others who are devoting their lives to improving such humble but indispensable engine parts as valves and fuel pumps, lubricants and gasoline.

Senator O'Mahoney, chairman of the committee, distributed copies of THE IRON AGE series, "The Threat to the Machine," among committee members. He criticized a quotation attributing to him the statement that science and invention are the cause of all our troubles today. The statement, the Senator said, had been quoted from the text of remarks he once made and did not reflect his views. The remarks referred to were made in a speech which the Senator delivered in New York about two years ago before the Wholesale Grocers Association.

mercially practical. Arthur L. Stewart, now chief engineer and director of the company, designed the machine used in the new process.

Another revolutionary gear development was pioneered by the Gleason Works in 1925 when Ernest Wildhaber invented a process and machine for the manufacture of the Hypoid gear, in which the axis of the pinion is offset from that of the gear. These gears have made it possible not only to lower the bodies of automobiles but are credited with having given the automobile industry a stronger and smoother drive.

In 1937 came the Zerol bevel gear whose teeth are curved longitudinally but without a spiral angle. Today the company builds machines for manufacturing gears ranging in diameter from a small fraction of an inch to over 40 ft.

Recent honors bestowed on James E. Gleason include the A.S.M.E. gold medal for 1939, presented at the 60th annual meeting of the A.S.M.E., in Philadelphia, for distinguished service to the automotive industry in making possible better and safer gear drives. In 1926-27 Mr. Gleason was

president of the National Machine Tool Builders' Association. He has also been president, and is now director, of the Rochester Chamber of Commerce, a trustee of the University of Rochester and of the Rochester Bureau of Municipal Research, and a director of the Rochester Athenaeum and Mechanics Institute.

New Shipbuilding Company Is Formed at Camden, N. J.

FORMATION of the RTC Shipbuilding Corp., Delaware Avenue and State Street, Camden, N. J., has been announced. Officers of the new company, all of whom were formerly associated with the John H. Mathis Co., Camden, N. J., are L. M. Robinson, president; George R. Taylor, vice-president, and J. P. Carson, secretary and treasurer. The company will engage primarily in marine plate construction, building tankers, barges, tugs, etc.

Sufficient orders are on the company's books at present to assure capacity operations for one and one-half years.

Steel & Wire to Modernize Equipment at Donora, Pa.

DONORA, PA.—American Steel & Wire Co. will spend about \$520,000 for modernization of its wire drawing facilities here. Work is scheduled to begin soon and will require about six months for completion.

Steam operated equipment in the wire drawing department will be replaced by new electrically operated wire drawing machinery and auxiliary equipment. Some of the outmoded machinery is 35 years old. It is understood the work will be done without completely shutting down the plant.

SWOC Wins Check-Off at Washington Tin Plate Co.

WASHINGTON, PA.—Washington Tin Plate Co. here recently signed a contract with the SWOC providing for check-off of union dues from payrolls and guaranteeing a minimum daily wage of \$5.00. Approximately 500 employees were involved.

HEROIC SCULPTURE IN

WHAT is probably the greatest piece of symbolic sculpture of all time is this week being erected on the new Associated Press building, Rockefeller Center, New York City. This mammoth, 10-ton 18x24 ft. bas-relief plaque of stainless steel, symbolizes America's free press. The sculptor is Isamu Noguchi, win-

ner of the Rockefeller award, and it is the first piece of heroic sculpture cast in stainless steel.

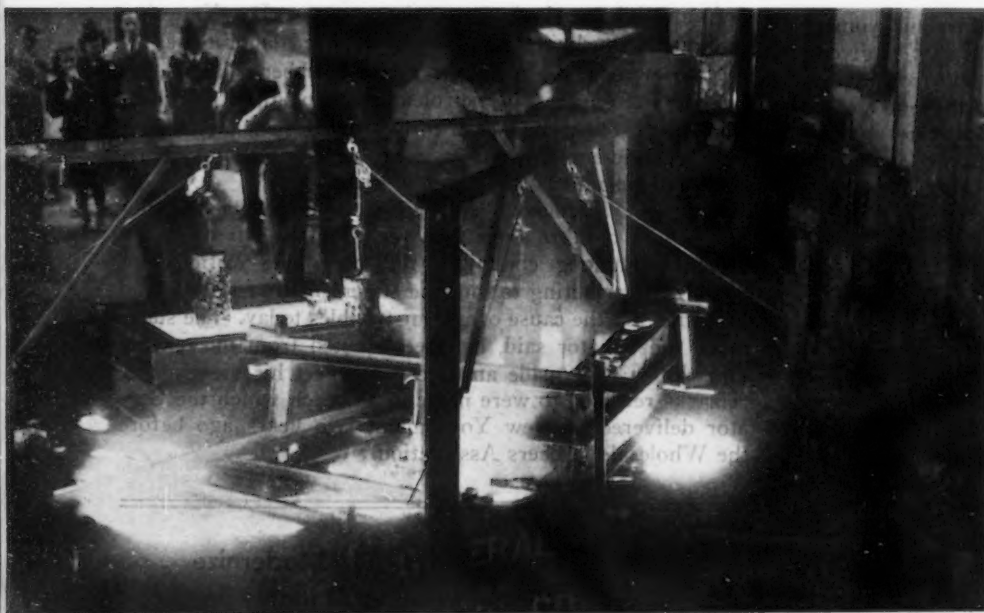
General Alloys Co., Boston, under direction of H. H. Harris, president, undertook the very difficult task of casting this very large plaque. The pattern was the full scale, 18x24 ft. plaster model, enlarged by Noguchi

from his original quarter-size model, with which he won the Rockefeller award. A great deal of study of the artistic requirements and technical limitations was necessary to determine the number of sections in which to manufacture the plaque, and how the proportions should be divided. It was eventually made in nine sections, the largest one weighing over 2 tons, and the smallest approximately 1200 lb.

The sections had to be increased over the original dimensions to allow for machining and contouring. The plaster model-pattern, made on wooden armatures, had to be heavily reinforced in steel and cement, before they could stand the weight and extra hard packing of sand, rammed hard with air rammers, to withstand the cutting action of the stainless steel.

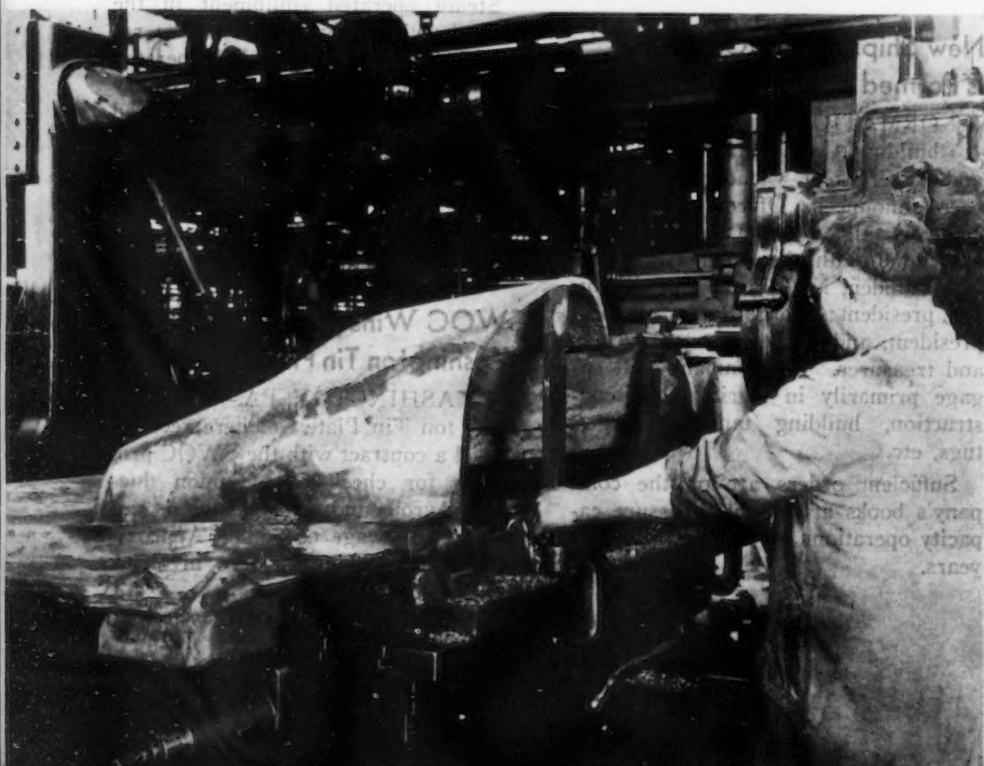
The design required many loose cores—these and the entire molds were made in synthetic sand, baked in ovens. Each core or separate piece of sand had a steel armature or reinforcing arbor, especially designed as a skeleton to support the sand against the high pressure of the metal, and to locate it precisely in position and to permit hollow construction for gas outlet. Heavy structural steel flasks, much heavier and more rigid than commonly employed, were required, as the slightest movement of the flask would have destroyed the contour of the sculptured work.

Because of the cutting action of large quantities of molten metal at the high pouring temperatures, approximately 3000 deg. F., it was desired to avoid pouring the molten metal over any large area from any one inlet. Therefore, as many as 80 different gates, in some sections as many as one to the square foot, were employed. Molten metal was fed into these gates from reservoirs on top of the molds, equipped with plug valves that provided instant and simultaneous release of metal in all the gates, so that the mold was filled in one second by a terrific surge of metal, thus avoiding molten metal wandering over the surface, cutting into the sand, and cooling ununiformly. This practice is clearly shown in the one accompanying photograph, supplied by Associated Press. The larger sections were poured simultaneously with two ladles, the largest amount of metal being poured at any one time being 5600 lb. Special ladles



MOLD for largest section of plaque. Pouring basins on top are equipped with "bath tub" plugs. The basins are filled with tons of molten stainless steel, the plugs are pulled, and the metal instantly released to fill the mold through 80 runners.

MILLING the edge of one plaque section to 0.002 in. for fitting into other sections of the plaque. This is said to be the first piece of sculpture ever joined by machining to line and assembling in this manner.



STAINLESS COMPLETED

were employed, with straining devices in the pouring spout to prevent slag from entering the mold. Slag traps were also employed in the gating.

A remarkable part of the job was the meticulous care employed in so calculating the shrinkages and strains over widely varied angles and contours so that it was possible to cast different sections at different times, entirely different in form, except for their matching edges, and have them match to a precision of less than $\frac{1}{8}$ in. The shrinkages of the metal, from molten to cold state, is over 0.25 in. per ft., and some of the contoured edges totalled more than 25 ft. The flat sections shrink at one rate, and the curved sections at varying rates. The secret of the shrinkage control was absolutely uniform temperatures of each square foot of the metal in the molds, which is a different approach to foundry problems. Heretofore, each part of the metal in any casting has traveled a different distance and over a

varied amount of heat absorbing surfaces, cooling at varying rates so that shrinkages and strains are widely varied. This technique was originally developed in working large difficult stainless steel castings for the United States Navy.

Because the high temperature of welding would result in excessive warpage it was deemed inadvisable to attempt to join such complex forms by welding so the sections were joined by machining them to match to 0.002 in., forming a practically invisible line. Laying out these lines to such accuracy on distances totaling more than 25 ft. called for great precision. The sections of the plaque were joined by uniform full contact of the edges of the sections for their full thickness. The sections were joined by doweling, and bolting from the rear of the plaque. The entire plaque is hung from one 30-in. girder, running across its center line horizontally, and requires no other reinforcement.

Finishing required the removal of the surface of the metal with high-powered grinders turning at exceptionally high speeds made possible by special high-cycle generators, have 240 cycles as compared to the 60 cycles of regular alternating current.

Special grinding wheels were employed which were matched as to grits with various sized wheels on different grinders, and the speeds of the grinders were adjusted to give the same surface speed per minute, on wheels of widely varying diameter—using speeds from 5000 to 25,000 r.p.m., otherwise the finish grinding with different tools would not match.

It was first intended to make the surface bright, starting with a high polish and then dulling it down slightly like old silver. This has proved to have such unique reflecting qualities that the detail of the design was lost in the sheen of reflected light. It was then decided to use a much coarser finish, having reduced light reflecting qualities, and instead of contouring the grinding to the form, grinding in a variety of angles was used to break up light reflection.



ABOVE

Assembling the entire plaque in the machine shop during manufacture.

o o o

AT RIGHT

Isamu Noguchi, sculptor, personally finishing a section of the plaque with a high power 15,000 r.p.m. grinder.



New Developments Covered in Gas Clinic

(CONTINUED FROM PAGE 53)

compounds from sea water, being done on the West Coast; extinguishing fires from coal bunkers by blanketing with flue gas; bright annealing of copper tubing in atmosphere produced by condensing combustion products in tubular condenser with well water at 55 deg. F.

"Just so that no one will accuse us of secrecy, let us consider two little trouble-makers," he continued. "Sulphur is the first, forming several oxides, hydrogen sulphide and organic compounds. The chemists of our industry are hard at work on methods intended to remove the last traces of sulphur from gas should that become necessary. Manufactured gas representatives at this meeting undoubtedly have considerable experience with the effect of organic sulphur in connection with heat treating atmospheres. It is well-known, for example, that partial combustion converts most of this sulphur to the oxides which may be removed by washing, but some sulphur may be converted back to hydrogen sulphide and some to organic sulphur. The former is removed readily enough by an oxide tower but the latter may be carried through into the furnace.

"Larry Wagner found 0.04 of a grain per hundred cu. ft. of sulphur (0.00003 per cent) in the muffle atmosphere in a copper tubing plant after this treatment (initial manufactured gas containing 4 to 6 grains). The finished tubing, however, is a good product, and this sample, says Larry, proves it. On the other hand, a very slight shift in the percentage of carbon monoxide over or under the range 0.5 to 1.5 per cent seems to cause blackening.

"Sulphur is not the only mystery. The formation of oxides of nitrogen from combustion has not been widely investigated, and specific data is hard to obtain. We know that industrial operations will produce around 100 parts per million of nitric oxide by volume, but quantities as high as five thousand parts per million have been found under certain conditions. Discussing this with Elmer Dunkak brought out that his experience indicated a relation between the chilling of the flame and the production of nitric oxide, although in quantitative relationship, he felt that rapid cooling

of the flame would lead to an increase in nitric oxide. Nitric oxide is corrosive, chemically active and may interfere with certain protective operations."

Developments in open flame heating were reviewed by A. M. Thurston, East Ohio Gas Co., Cleveland, in a paper pointing out their importance to the gas industry. Discussing the flash baking of insulating varnish on materials used in electric motor manufacturing, the speaker supplied data on continuous and recirculating ovens at Reliance Electric Co., Cleveland; General Electric Co., Erie, Pa., and Elliott Co., Ridgeway, Pa., all designed by James Campbell Smith, Cleveland, and equipped with light conveyors consisting of strands of wire.

The Reliance furnace is engaged in baking black core plate varnish on 26-gage sheets. The varnish is cut back with about 50 per cent kerosene. The oven burners consist of five flash burners rated at 100,000 B.t.u. each and on one pilot, also one heater burner rated at 400,000 B.t.u., on separate pilot and controlled "off and on" by a thermostat set at 650 deg. F.

The flash burners ignite the kerosene and bake the varnish in 45 seconds, with another 45 seconds required for cooling the sheet. The total time of 1½ minutes is a marked time saving over previous methods, the speaker said. Around 2800 lb. of work per hr. can be handled and the fuel required will approach 300,000 B.t.u. per ton of 26-gage sheet under full operation. Burners were furnished by Western Products Co., and on another job by North American Mfg. Co.

Mr. Thurston reviewed direct flame annealing of non-ferrous wire, developed by Syncro Machine Co. and Surface Combustion Corp., about which considerable has been written recently, and pointed out that much interest centers upon the potentiality of this equipment, how far it will replace conventional processes, initial cost, operating cost, size, and what other metals can be flame annealed besides copper.

Discussing improvements in the metallizing process, Mr. Thurston took up the following phases:

(A) Maintenance—Iron, steel, and

bronze can be applied to worn parts to bring a tool, a bearing or a race back to its original form and operation.

(B) Corrosion Resistance—Aluminum can be applied to iron and steel and in some cases to copper and bronze to protect against oxidation and scaling at elevated temperatures. Aluminum can also be applied to nickel and nickel-chrome alloys to protect them against the attack of sulphurous gases. Zinc, tin, lead and cadmium are well known protective metal coatings to retard corrosion and their applications are unlimited.

(C) On Production Operation—It is possible by this process, to add a surface or section of an expensive metal where needed, with the balance of the part, structure, or machine, made of a lower grade material.

Metallizing is being applied to the application of copper to carbon in carbon brush manufacture, he said. Formerly the brush was soaked in gasoline, then plated in an acid copper bath.

The speaker then reviewed scarfing, cutting, spot annealing, flame hardening, brazing and descaling, pointing out the advantages of gas.

At half a dozen Middle Western steel plants there is evidence that natural or artificial gas is an economical fuel for scarfing, he asserted.

"In conclusion," said Mr. Thurston, "here are a few miscellaneous processes which may suggest a treatment for some sore spot in your territory. A carton manufacturer was using a heavily waxed paper and was having trouble sticking the carton edges together. A 24-in. drill pipe burner with "drive fit" tips and a 2-valve mixing tube was the means of forcing a flame down on the paper enough to soften the wax for a seal. This is usually done with an iron.

"Several of our foundries are lighting small cupolas with a single portable 3-in. gas air torch and one uses 3 portable torches to light a larger cupola.

"A zinc die castings manufacturer is salvaging defective castings by filling flaws with solder using gas-oxygen torches.

"A washing machine tub manufacturer is rolling the edge of the tub with a semi-circle of tips preheating the steel."

Through standardization in the production of gas utilization equipment for industrial purposes, expense of engineering, production, routing and other costs can be reduced materially, and shipments expedited, said A. H. Koch, Surface Combustion Corp., in

a paper titled, "Load Building through Packaged Industrial Equipment."

If the full engineering and pattern costs must be charged against only one oven produced, this furnace would be considered as a special job, he continued. If a standard furnace with some minor modifications could be used, the required engineering might be reduced about two-thirds. Pattern charges would remain the same, probably. A saving of about 12½ per cent

gas fuel being \$700 per year, he said, if the equipment required must be special and costs \$2,000, the period of amortization would be 4.3 years, or quite high in the average prospect sales group, since amortization time of three years or less represents to the user a great saving over a period of years. As a general rule, gas utilization equipment for industrial purposes has an estimated life of about ten years, he said. If packaged equipment

fullest extent. Packaged industrial equipment can be of marked assistance in keeping gas fuel well ahead of competitive fuels and help it maintain the reputation of being 'the ideal fuel.'

"Only through the cooperation of the utilities and the equipment manufacturers can gas fuel attain and hold its maximum industrial load, the utilities to supply the best fuel at the lowest possible cost and the equipment manufacturers to supply the best equipment at the lowest possible prices. To that end all efforts should be jointly directed."

H. Carl Wolf, chairman, general sales committee of the A.G.A., industrial gas section, and president of the Atlanta Gas Light Co., Atlanta, Ga., presented a paper entitled, "Planning for Increased Sales."

"Industrial gas is sold because of its effect on the customer's balance sheet," said Mr. Wolf, "and there are other factors than outright dollars and cents which bear upon this situation. Confidence is the keynote of our industry."

"Research and engineering development must always be real tools for us."

The speaker suggested the development of more handbooks and sales helps, and urged the application of "showmanship."

"It is our obligation to see that the customer gets the most for his money," he continued. "We must sell the real merits of gas."

Factors involved in merchandising gas air conditioning were presented in an interesting paper by Kendall B. Castle, Jr., Rochester Gas & Electric Corp., Rochester, N. Y. Window displays were covered by an illustrated lecture by Lloyd E. Thomas, Michigan Consolidated Gas Co., Detroit. A session titled "Stump the Experts!" proved highly interesting, patterned after the famed "Information Please" radio program. A group of experts undertook to answer highly technical questions submitted by members of the audience.

The viewpoint of a customer was brought by William E. Whalen, Electric Auto-Lite Co., who supervises industrial heating operations in plants scattered over 18 states and making 60 distinct auto parts.

"In the last few years there has been less misapplication of gas equipment than ever before," said Mr. Whalen.

"The gas industry's legal responsibility ends at the meter but the implied responsibility carries on until the last practical heat unit has been utilized."



A. M. THURSTON, Supervisor of Industrial Sales, the East Ohio Gas Co., Cleveland, steps down from the platform to pass to the audience samples of non-ferrous wire bright-annealed continuously at lightning speeds in new open-flame equipment using neither furnace nor atmosphere tube. Samples of insulated and varnished sheet flash-baked in open flames, and 5 in. stock precisely cut with city-gas-oxygen torches, were also distributed (Franklin T. Rainey, 1940 Chairman, Industrial Gas Section, American Gas Association, is on receiving end).

of the overall cost would be realized in this case. But with the design completely standardized, engineering and pattern charges are reduced 99 per cent, labor can be cut about 5 per cent which will result in an overall saving of about 25 per cent of the complete furnace.

The speaker presented a savings and amortization chart from which an analysis of any prospective installation can be made. Taking as an illustration a proposed installation costing \$1,167 per year to operate with a competitive fuel, the estimated cost with

can be used in the above installation, the cost will be reduced about 25 per cent to \$1,500, and the period of amortization will then be only 3.2 years.

"Irrespective of the fuel which is competitive to gas in any particular locality, the sponsors of that competitive fuel are endeavoring by every means possible to better utilize the fuel they have to offer," said Mr. Koch. "Gas fuel is continually faced with the necessity of maintaining its position in this competitive situation. To do so, every advantage must be used to its

Design Developments in Upsetting Forging Machines

AN 8-in. upsetting forging machine, weighing close to a half million pounds, was recently built by the *Ajax Mfg. Co.*, Cleveland, for the purpose of producing large size upset forgings within unusually close limits of size in order to reduce subsequent machine operations. Longitudinal rigidity is provided by a one-piece integral frame and the frame is rigid transversely also, due to a deep C-clamp distribution of metal beneath the throat and two heavy transverse tie clamps above. As a result of the more exact alignment of die obtained, flash and eccentricity have been practically eliminated, and the machine will handle a range of jobs not possible on older types of machines.

This 8-in. machine will accommodate dies 46 in. high so that as many as four progressive stages can be used. Exceptionally large opening between die halves has been obtained. This machine is driven by a 150-hp. motor through V-belt to a flywheel and air clutch assembly. The tripping of a small foot valve causes the air clutch to engage instantly, adding to the productivity of the unit. In the set-up provided, stock is fed to machine from furnaces on either side by means of a pair of cranes from which the work is supported during the entire cycle.

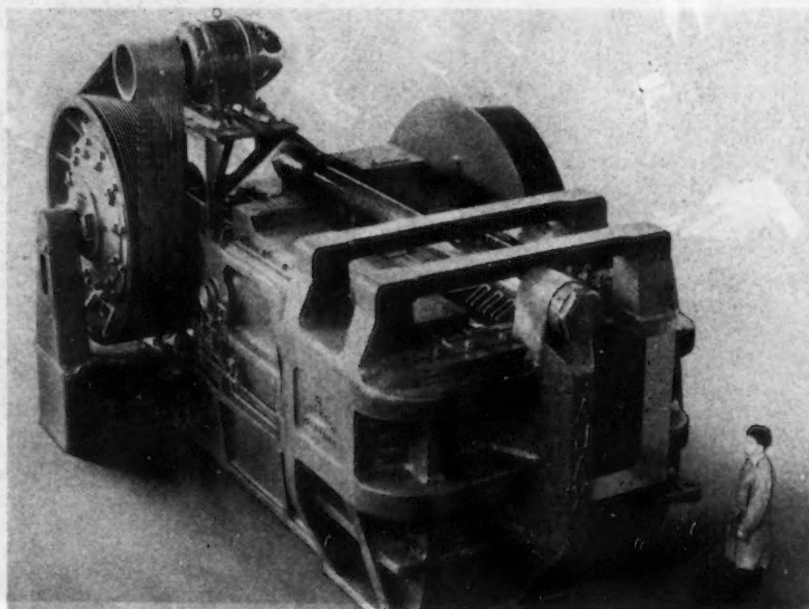
Clutch for Forging Machine

AN extremely oversize clutch has been adopted by the *National Machinery Co.*, Tiffin, Ohio, for use

on its upset forging machines and its line of Maxipresses. It is air operated by a large centralized piston which overhangs the flywheel, and the design is such that the clutch can be serviced without removing the flywheel or disturbing its bearings. The centralized location of the operating piston insures equalized pressure over the clutch faces so that a maximum of torque is obtained and slipping and heating of the clutch is reduced to a minimum. Furthermore, the air inlet directly over

the center of the piston gives instantaneous piston action in starting and declutching. All the clutch plates float to position in closing.

The suction fan cooling system is an integral part of the flywheel webbing. It is so arranged that none of the cooling air can circulate between the plates and carry in shop dirt and greasy deposits which reduce the efficiency of the clutch. Grease from the bearings is also prevented from reaching the clutch faces.

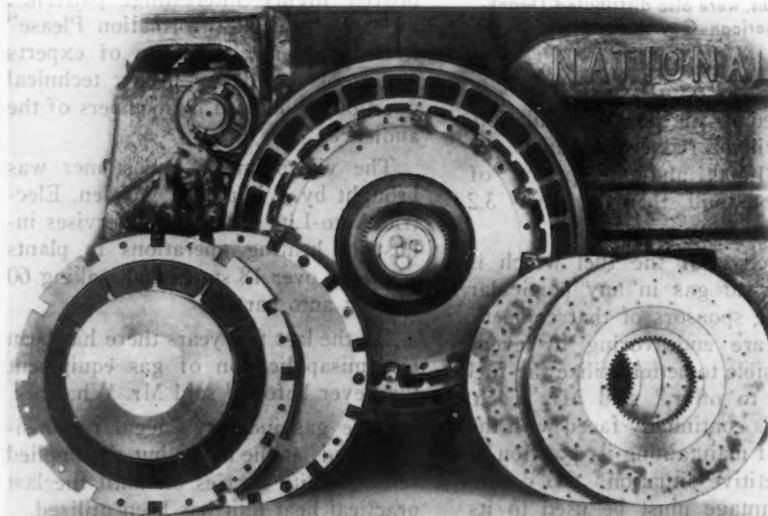


ABOVE

THIS huge 8-in. forging machine recently built by the *Ajax Mfg. Co.* weighs 470,000 lb. and required special freight cars to ship it. The two heavy transverse tie clamps contribute to the rigidity and reduce flash and eccentricity to a minimum. Accommodating dies 46 in. high, the machine permits as many as four progressive operations for fabricating heavy forgings from large stock.

o o o

LEFT



DISASSEMBLED view of the new air-cooled, pneumatically controlled friction disk clutch developed by *National Machinery Co.* It is shown applied to a *National 4-in.* forging machine, but is available on all sizes of these machines, the *National Maxipresses* and for other heavy duty service.

March Pig Iron Output Drops 7.6 Per Cent

REVISED production of coke pig iron in March totaled 3,270,499 net tons, compared with 3,311,480 tons in February. On a daily basis March output dropped 7.6 per cent from that in February, or from 114,189 net tons in February to 105,500 tons in March.

Based on a revised capacity of 149,687 net tons of coke pig iron daily, the operating rate for the industry averaged 68.9 per cent in March, against 75.1 per cent in February, and 56.8 per cent in March a year ago.

There were 152 furnaces in blast on April 1, operating at the rate of 104,675 net tons a day, compared with 157 in blast on March 1, producing 106,040

Furnace Operation Now At 68.9 Per Cent, With 152 Stacks in Blast

net tons. Nine furnaces were blown out during March and four were put in operation.

The United States Steel Corp. blew out or banked three furnaces, independent producers blew three in and took two off blast, and merchant producers blew out or banked four furnaces and put one in operation.

Among the furnaces blown in were: One Lackawanna, Bethlehem Steel Co.; one Haselton, Republic Steel Corp.; one Campbell, Youngstown Sheet & Tube Co., and one North Birmingham furnace of Sloss-Sheffield Steel & Iron Co.

Furnaces blown out or banked included: One Palmerton, New Jersey Zinc Co.; one Duquesne, one Farrell, one South Chicago (old), Carnegie-Illinois Steel Corp.; one Perry, Interlake Iron Corp.; one Sharpsville, Pittsburgh Coke & Iron Co.; one River and one Pioneer, Republic Steel Corp.; and one City, Sloss-Sheffield Steel & Iron Co.

Production by Districts and Coke Furnaces in Blast

FURNACES	(All Figures in Net Tons)		April 1		March 1	
	March (31 Days)	February (29 Days)	Number in Blast	Operating Rate, Net Tons a Day	Number in Blast	Operating Rate, Net Tons a Day
New York:						
Buffalo	224,941	213,434	10	7,255	9	6,955
Other New York and Mass.			0		0	
Pennsylvania:						
Lehigh Valley	91,164	80,040	5	2,940	5	2,725
Spiegeleisen	11,251	11,228	1	180	2	385
Schuylkill Valley	43,713	42,149	3	1,410	3	1,455
Susquehanna and Lebanon Valleys	45,419	34,681	2	1,465	2	1,615
Ferromanganese	3,182	2,985	1	105	1	105
Pittsburgh District	685,726	756,083	28	21,450	30	22,370
Ferro. and Spiegel	27,461	15,480	4	885	3	535
Shenango Valley	13,370	34,932	0		2	945
Western Pennsylvania	118,068	116,716	6	3,625	7	4,025
Ferro. and Spiegel	15,991	14,298	1	515	1	495
Maryland	205,761	186,047	6	6,635	6	6,415
Wheeling District	172,859	141,587	7	5,575	7	5,010
Ohio:						
Mahoning Valley	239,221	231,169	11	8,710	9	7,010
Central and Northern	254,119	261,465	12	8,085	13	9,140
Southern	62,294	58,653	5	2,010	5	2,025
Illinois and Indiana	587,432	649,656	21	18,900	22	18,690
Michigan and Minnesota	126,917	128,090	6	4,095	6	4,165
Colorado, Missouri and Utah ..	50,367	55,136	4	1,625	4	1,900
The South:						
Virginia			0		0	
Ferromanganese	3,539	3,347	1	115	1	115
Kentucky	12,925	12,514	1	415	1	130
Alabama	269,199	257,500	15	8,500	16	8,880
Ferro. and Spiegel	3,224	2,610	1	105	1	90
Tennessee	2,356	1,680	1	75	1	60
Total	3,270,499	3,311,480	152	104,675	157	106,040

Production of Coke Pig Iron and Ferromanganese

	(All Figures in Net Tons)			
	Pig Iron*		Ferromanganese†	
	1940	1939	1940	1939
January ..	4,032,022	2,436,474	43,210	23,302
February ..	3,311,480	2,307,409	38,720	20,894
March ...	3,270,499	2,681,969	46,260	17,928
April		2,302,918		12,900
May		1,923,618		8,835
June		2,372,665		18,611
½ year		14,025,053		102,470
July		2,639,022		23,758
August		2,978,991		23,103
September ..		3,223,983		24,583
October		4,062,901		26,817
November		4,166,888		33,999
December		4,220,536		40,654
Year ..		35,317,374		275,384

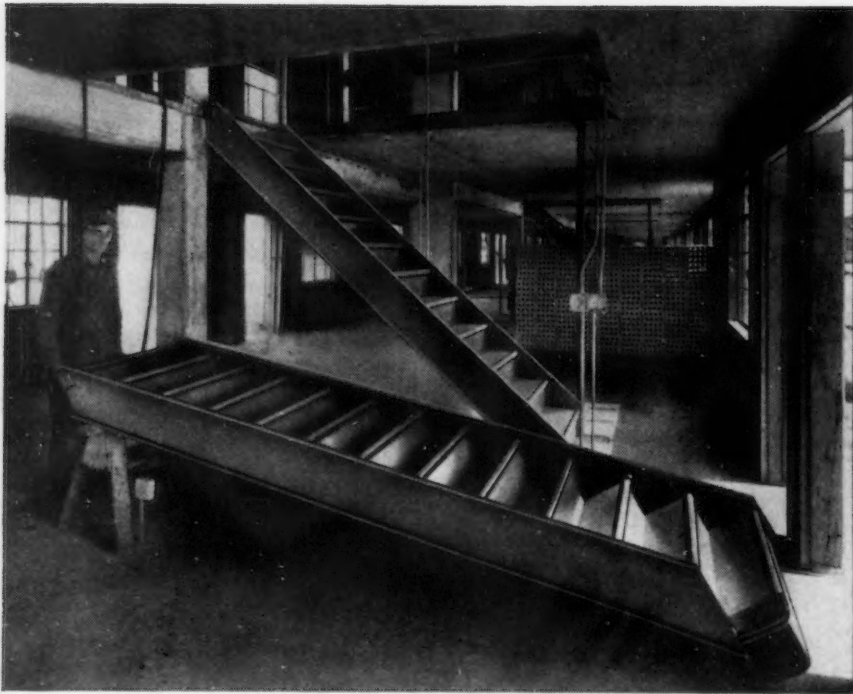
*These totals do not include charcoal pig iron. †Included in pig iron figures.

Daily Average Production of Coke Pig Iron

	1940	% Capacity	1939	% Capacity	1938
January ..	130,061	85.8	78,596	51.5	51,632
February ..	114,189	75.1	82,407	54.0	51,931
March ...	105,500	68.9	86,516	56.8	52,476
April			76,764	50.4	51,376
May			62,052	40.8	45,343
June			79,089	51.7	39,648
½ year			77,486		48,717
July			85,130	55.8	43,417
August			96,096	62.9	53,976
September ..			107,466	70.4	62,737
October			131,061	85.9	74,147
November			138,877	90.9	84,746
December			136,146	89.4	79,872
Year ..			96,760		57,633

Merchant Iron Made, Daily Rate

	1940	1939	1938	1937	1936
January ..	16,475	11,875	11,911	18,039	11,801
February ..	14,773	10,793	9,916	18,496	12,652
March ...	11,760	10,025	9,547	18,432	12,131
April		9,529	9,266	16,259	15,565
May		7,883	7,203	21,821	14,352
June		8,527	6,020	17,774	15,914
July		9,404	6,154	21,962	13,013
August		11,225	7,408	19,971	13,606
September ..		12,648	12,550	22,473	14,029
October ...		16,409	12,095	21,224	15,282
November ..		16,642	14,793	17,541	16,508
December ..		16,912	10,226	12,280	16,634



J. & L. Makes New Light Channel for Stairways

THE Jones & Laughlin Steel Corp., Pittsburgh, is now manufacturing what is said to be the lightest 10-in. hot rolled steel channel section in the world, weighing only 6½ lb. to the foot. Designed to meet the increasing demand for rigid steel stairs in residences, apartments, housing projects, and other light occupancy buildings,

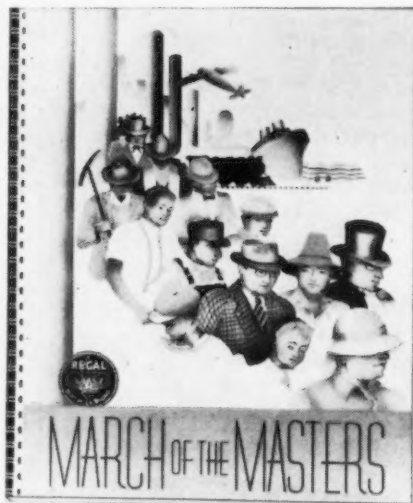
this new lightweight channel supplies ornamental metal manufacturers with a product of true shape and accurate dimension of known structural quality steel, and is said to be stronger than cold formed steel channels of equal weight. The illustration shows its use in a Federal housing project.

Colorful Book Describes LeBlond Lathes

A FIFTY-PAGE, spiral bound book entitled "March of the Masters" is a colorful new publication by the R. K. LeBlond Machine Tool Co., Cincinnati, devoted to the company's Regal and Super Regal line of lathes. The format is in keeping with the company's policy of humanizing its advertising literature and recalls the attractive former booklets entitled "Main Street," "Seven Times Around Jericho," and others.

A double-page spread of airbrush drawings in three colors, used to illustrate the "march of the masters," is followed by illustrated descriptions of the 24 and 21 in., and the 19 and 17 in. Super Regal lathes, an outgrowth of the lighter, simplified Regal "light lathe line." Also, the 24 and 21 in. gap lathes, and the 15 and 13 in. Super Regals, and finally the smaller units, namely, the 10 in. Regal, and the 13 and 10 in. bench lathes.

In other sections, features of headstock, tailstock and bed, carriage and compound rest, feed mechanism, aprons and quick change gear boxes are described and illustrated. Pages are devoted to standard and special equipment, and comprehensive speci-



fications and dimensional data covering all machines are given. A number of shop views show the making and inspection of these lathes.

Two Canadian Provinces Adopt A.S.M.E. Boiler Code

THE provinces of Ontario and Manitoba in Canada recently passed orders-in-council providing for the adoption of several sections of the A.S.M.E. Boiler Code as part of their laws. The passage of the laws followed the approval of the Canadian Engineering Standards Association which held hearings on the subject during the past three years. Recommended by the C.E.S.A. for adoption by the government of the Canadian provinces were the sections of the A.S.M.E. Boiler Code dealing with power, low-pressure heating, and miniature boilers, material specifications, unfired pressure vessels, and rules for the care of power boilers. Other sections not yet approved in Canada are those covering locomotive boilers and rules for inspection.

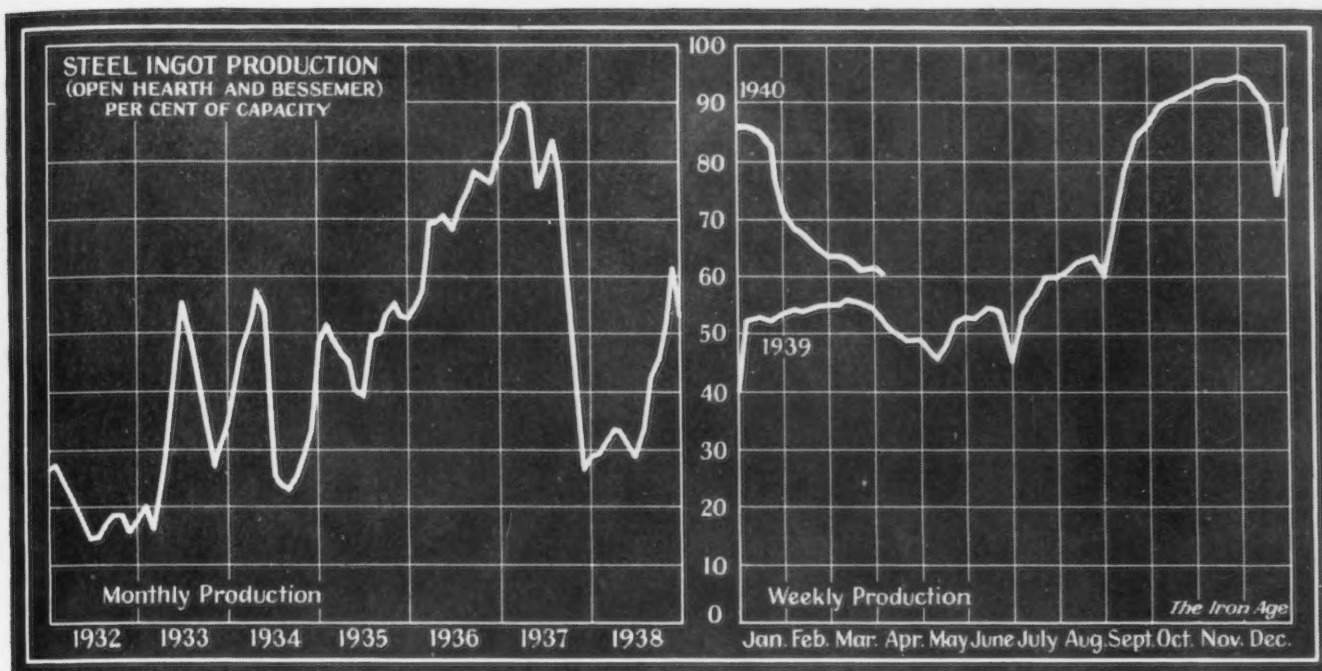
Steel Founders Study Electric Melting

PROBLEMS of electric steel melting were studied by 140 foundrymen, open hearth plant operators and electric ingot shop metallurgists at a conference held March 21 to 23 at Battelle Memorial Institute, under the sponsorship of Steel Founders' Society and the Electric Metal Makers' Guild.

The design, construction and operation of electric furnaces were described by N. R. Stansel, General Electric Co., while T. L. Nelson, National Carbon Co., discussed carbon and graphite electrodes. Refractories and furnace linings was the subject of a talk by L. S. Fry, Joslyn Mfg. & Supply Co. Raw materials were covered by Adolph Schoid, Jr., Columbia Tool Steel Co.

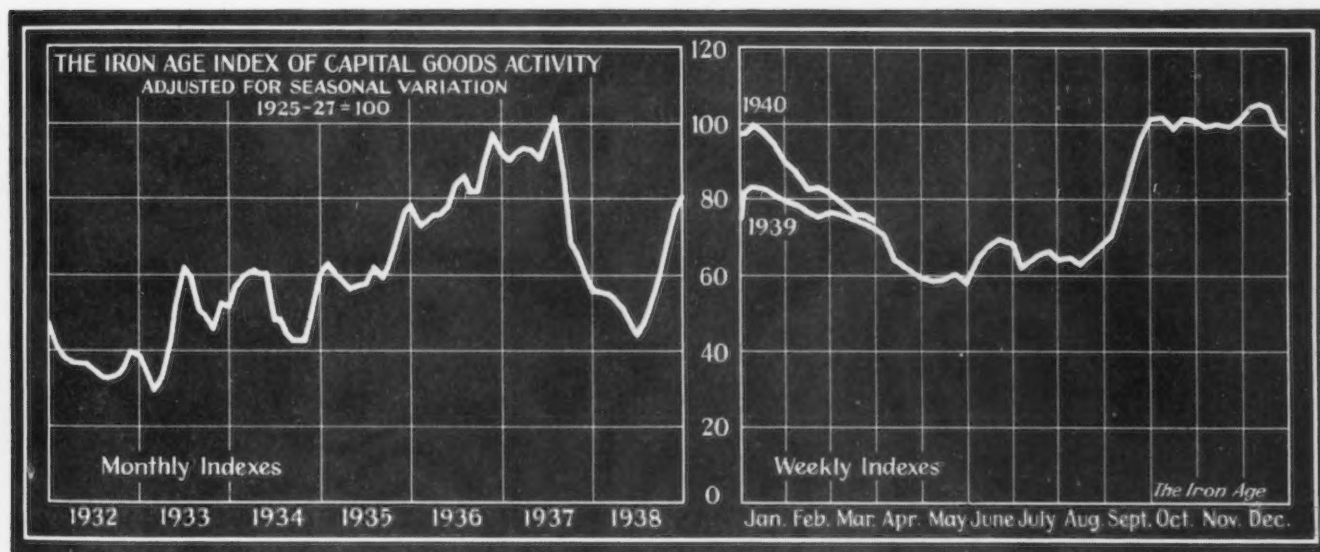
An outstanding feature of the meeting was the lecture by Dr. C. H. Herty, Jr., Bethlehem Steel Co., on fundamentals of the chemistry of steel making. Other speakers at the conference were C. E. Simms, metallurgist, Battelle Memorial Institute; Dr. Gillett, chief technical adviser of the institute; Dr. C. H. Lorig, also of the institute, and C. W. Briggs, technical adviser, Steel Founders' Society.

Ingot Rate Drops Back to 61% of Capacity



District Ingot Production, Per Cent of Capacity		Pittsburgh	Chicago	Valleys	Philadelphia	Cleveland	Buffalo	Wheeling	Detroit	Southern	S. Ohio River	Western	St. Louis	Eastern	Aggregate
		54.0	57.5	49.0	63.0	62.0	46.0	65.0	78.0	77.0	55.0	70.0	45.0	50.0	61.0
	CURRENT WEEK..	54.0	57.5	49.0	63.0	62.0	46.0	65.0	78.0	77.0	55.0	70.0	45.0	50.0	61.0
	PREVIOUS WEEK..	58.0	57.0	46.0	63.0	64.0	46.0	62.0	72.0	81.0	55.0	70.0	50.0	85.0	61.5

Index Off 1.6 Points to 73.9



DESPITE an encouraging gain in the volume of private construction awards placed in the week, the combined average of THE IRON AGE capital goods index lost 1.6 points in the week ended April 6, establishing a new low for the current year. The steel production series moved higher in the week, the first gain registered this year, but major declines were indicated in the Pittsburgh, lumber and automobile series. Construction awards in the past week amounted to \$55,837,000, 60 per cent above the preceding week and 92 per cent above the corresponding week of 1939. Private awards were \$22,512,000, while publicly financed work amounted to \$33,325,000.

	Week Ended April 6	Week Ended March 30	Comparable Week	
Steel ingot production ¹	79.0	78.3*	1939	1929
Automobile production ²	87.5	91.7	70.0	122.2
Construction contracts ³	59.5	59.3	74.9	124.2
Forest products carloadings ⁴	57.5	60.4	86.6	119.8
Production and shipments, Pittsburgh District ⁵	86.2	87.9	48.9	131.9
Combined index	73.9	75.5*	73.3	117.7
			70.7	129.6

*Revised.

Sources: ¹ THE IRON AGE; ² Wards Automotive Reports; ³ Engineering News-Record; ⁴ Association of American Railroads; ⁵ University of Pittsburgh. The indexes of forest products carloadings and activity in the Pittsburgh area reflect conditions as of the week ended March 30. Other indexes cover the week of April 6.

... SUMMARY OF THE WEEK ...

... Order volume gains moderately and is in closer balance with shipments.

• • •

... Production rate for industry off slightly, but some districts gain.

• • •

... Spread of war area creates problems for exporters, but larger demand is seen.

A FURTHER moderate seasonal gain in domestic steel business, together with a substantial and increasing volume of export tonnage, has created renewed confidence in the steel industry that the bottom of the long decline has been reached. Although no important rise in production is expected in the near future, better feeling is derived from the fact that incoming orders are in closer balance with shipments, and in some instances are equal to 50 to 60 per cent of capacity.

Export tonnage has increased within the past week following an advance in prices, which has stimulated prompt acceptance of outstanding lower quotations. The spreading of the war area may bring fresh demands to the United States.

The involvement of Denmark and Norway, and possibly Sweden, in the European war zone has created unexpected and pressing problems for American steel exporters, but the long-range view is that Norway, which has been receiving most of its steel imports from Germany, will turn to the United States. A similar development may occur in Sweden, which has been exchanging iron ore for German steel and other products.

In the first two months of this year Norway, Sweden and Denmark combined took 39,259 gross tons of iron and steel from the United States, and last year the total for these three countries was 190,438 tons. Denmark's imports from this country have been the smallest by far, having been only 2805 tons in January-February, this year, against 18,755 tons to Norway and 17,699 tons to Sweden. In recent years total imports of iron and steel by Norway and Sweden together have ranged from several hundred thousand tons to around a million tons.

Immediate effects of the new European crisis on the American steel situation are not yet clearly discernible, but until they are better understood some mills are not processing material for Scandinavian countries. Meanwhile there is concern over material that is afloat and on docks at Atlantic ports awaiting shipment. In

shipping circles it is believed that the Norwegian merchant fleet will be pooled with British and French fleets to operate under the convoy system.

DOMESTIC steel business has not been augmented by any particular development other than an apparent seasonal improvement in a number of products, in which structural steel is an outstanding exception. Conspicuous among the products in which fairly good gains have occurred is tin plate, production of which has risen two points to 63 per cent of capacity. A number of pipe lines figure in a better outlook for makers of tubular products.

Building construction activity has been a disappointment to fabricators of structural steel, who are also concerned over prices which are the lowest since the period of sharpest depression. Reinforcing bar tonnage is in fairly good volume, including an award of 10,000 tons for a dam in Texas, but the price situation in that product has not improved.

Railroad buying is still more of a promise than an actuality, but a dull market has been enlivened by orders from the New York Central for 50 locomotives and 1500 hopper cars, the latter to be built in the road's own shops.

Of the major steel consuming channels, it remains for the automobile industry to make the best showing, although its new purchases of steel are expected to dwindle as the end of the 1940 model season approaches. Meanwhile, retail sales are in high gear and are absorbing field stocks to an extent that forecasts a rise in the volume of assemblies.

A factor of some importance in current steel improvement is a mild rush of shipments to the Pacific Coast in anticipation of a rise in intercoastal water rates May 1. The advance amounts to 5c. per 100 lb. where the rate is \$1 or under; 8c. on rates over \$1 up to \$2; 10c. on rates over \$2 up to \$3, and 15c. on rates \$3 or higher.

INGOT production this week is estimated at 61 per cent, a loss of half a point from last week, most of which is accounted for by a drop of four points to 54 per cent at Pittsburgh, with lesser percentage declines at Cleveland and Birmingham. However, several districts have gained slightly, including Chicago, Youngstown, Wheeling-Weirton and Detroit. Total production of 14,230,373 net tons of ingots in the first three months of this year was exceeded in only two previous first quarters, in 1929 and 1937. The March total was 4,236,050 tons and the average operating rate was 63 per cent against 69.62 per cent in February.

Bullishness has taken the place of uncertainty in scrap markets as a result of the more acute war situation, but this has not yet been reflected in prices. A moderate decline at Chicago reduces THE IRON AGE scrap composite price 4c. to \$16.04.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Apr. 9, 1940	Apr. 2, 1940	Mar. 12, 1940	Apr. 11, 1939
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$40.00
Light rails: Pittsburgh, Chi- cago, Birmingham	40.00	40.00	40.00	40.00
Re-rolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Bir- mingham, Sparrows Point	34.00	34.00	34.00	34.00
Sheet bars: Pittsburgh, Chi- cago, Cleveland, Youngs- town, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	34.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngs- town, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	34.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Bir- mingham	40.00	40.00	40.00	40.00
Wire rods: Nos. 5 to 9/32 in., Pittsburgh, Chicago, Cleve- land, cents per lb.	2.00	2.00	2.00	1.92
Skelp, grvd. steel: Pitts- burgh, Chicago, Youngs- town, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	1.90

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.15	2.15	2.15	2.25
Plates: Pittsburgh, Chicago, Gary, Birmingham, Spar- rows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.10
Structural shapes: Pitts- burgh, Chicago, Gary, Buf- falo, Bethlehem, Birming- ham	2.10	2.10	2.10	2.10
Cold finished bars: Pitts- burgh, Buffalo, Cleveland, Chicago, Gary	2.65	2.65	2.65	2.70
Alloy bars: Pittsburgh, Buf- falo, Bethlehem, Massillon or Canton	2.70	2.70	2.70	2.80
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.10	2.10	2.10	2.15
Cold rolled strip: Pittsburgh, Cleveland, Youngstown ...	2.80	2.80	2.80	2.95
Sheets, galv., No. 24: Pitts- burgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham ...	3.50	3.50	3.50	3.50
Hot rolled sheets: Pittsburgh, Chicago, Gary, Birming- ham, Buffalo, Sparrows Point, Cleveland, Youngs- town, Middletown	2.10	2.10	2.10	2.15
Cold rolled sheets: Pitts- burgh, Chicago, Gary, Buf- falo, Youngstown, Cleve- land, Middletown	3.05	3.05	3.05	3.20

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Cents Per Lb.:	Apr. 9, 1940	Apr. 2, 1940	Mar. 12, 1940	Apr. 11, 1939
Wire nails: Pittsburgh, Chi- cago, Cleveland, Birming- ham	2.55	2.55	2.55	2.45
Plain wire: Pittsburgh, Chi- cago, Cleveland, Birming- ham	2.60	2.60	2.60	2.60
Tin plate, 100 lb. base box: Pittsburgh and Gary	\$5.00	\$5.00	\$5.00	\$5.00

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia ...	\$24.84	\$24.84	\$24.84	\$22.84
No. 2, Valley furnace	23.00	23.00	23.00	21.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	21.06
No. 2, Birmingham	19.38	19.38	19.38	17.38
No. 2, foundry, Chicago† ...	23.00	23.00	23.00	21.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	22.34
Basic, Valley furnace	22.50	22.50	22.50	20.50
Malleable, Chicago†	23.00	23.00	23.00	21.00
Malleable, Valley	23.00	23.00	23.00	21.00
L. S. charcoal, Chicago	30.34	30.34	30.34	28.34
Ferromanganese, seab'd car- lots	100.00	100.00	100.00	80.00

†The switching charge for delivery to foundries in the Chi-
cago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh...\$16.25	\$16.25	\$17.00	\$15.75	
Heavy melting steel, Phila... 16.75	16.75	17.25	15.75	
Heavy melting steel, Ch'go. 15.125	15.25	15.875	13.75	
Carwheels, Chicago	16.75	16.75	17.25	13.00
Carwheels, Philadelphia	20.25	20.25	20.25	16.75
No. 1 cast, Pittsburgh	17.75	17.75	18.25	15.50
No. 1 cast, Philadelphia ...	20.25	20.25	20.25	16.75
No. 1 cast, Ch'go (net ton). 14.75	13.25	14.25	12.25	

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	\$4.00	\$4.00	\$4.00	\$3.75
Foundry coke, prompt	5.25	5.25	5.25	4.75

Non-Ferrous Metals

Cents per Lb. to Large Buyers:				
*Copper, electrolytic, Conn... 11.50	11.50	11.50	10.75	
Copper, lake, New York ... 11.50	11.50	11.50	10.75	
Tin (Straits), New York ... 47.00	45.875	48.75	45.95	
Zinc, East St. Louis	5.75	5.75	4.50	
Zinc, New York	6.14	6.14	4.89	
Lead, St. Louis	5.05	5.05	4.60	
Lead, New York	4.85	4.85	4.75	
Antimony (Asiatic), N. Y... 16.50	16.50	16.50	14.00	

*Mine products only.

The Iron Age Composite Prices

April 9, 1940
One week ago
One month ago
One year ago

Finished Steel

2.261c. a Lb.	
2.261	
2.261	
2.286	

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

High	Low	
2.286c., Jan. 3	2.236c., May 16	
2.512c., May 17	2.211c., Oct. 18	
2.512c., Mar. 9	2.249c., Jan. 4	
2.249c., Dec. 28	2.016c., Mar. 10	
2.062c., Oct. 1	2.066c., Jan. 8	
2.118c., Apr. 24	1.945c., Jan. 2	
1.953c., Oct. 3	1.792c., May 2	
1.915c., Sept. 6	1.870c., Mar. 15	
1.981c., Jan. 13	1.883c., Dec. 29	
2.192c., Jan. 7	1.962c., Dec. 9	
2.236c., May 28	2.192c., Oct. 29	

Pig Iron

\$22.61 a Gross Ton	
22.61	
22.61	
20.61	

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

High	Low	
\$22.61, Sept. 19	\$20.61, Sept. 12	
23.25, June 21	19.61, July 6	
23.25, Mar. 9	20.25, Feb. 16	
19.73, Nov. 24	18.73, Aug. 11	
18.84, Nov. 5	17.83, May 14	
17.90, May 1	16.90, Jan. 27	
16.90, Dec. 5	13.56, Jan. 3	
14.81, Jan. 5	13.56, Dec. 6	
15.90, Jan. 6	14.79, Dec 15	
18.21, Jan. 7	15.90, Dec. 16	
18.71, May 14	18.21, Dec. 17	

Steel Scrap

\$16.04 a Gross Ton	
16.08	
16.71	
15.17	

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

High	Low	
\$17.67, Jan. 2	\$16.04, Apr. 9	
22.50, Oct. 3	14.08, May 16	
15.00, Nov. 22	11.00, June 7	
21.92, Mar. 30	12.92, Nov. 10	
17.75, Dec. 11	12.67, June 9	
13.42, Dec. 10	10.33, Apr. 29	
13.00, Mar. 13	9.50, Sept. 25	
12.25, Aug. 8	6.75, Jan. 3	
8.50, Jan. 12	6.43, July 5	
11.33, Jan. 6	8.50, Dec. 29	
15.00, Feb. 18	11.25, Dec. 9	
17.58, Jan. 29	14.08, Dec. 3	

1940.....
1939.....
1938.....
1937.....
1936.....
1935.....
1934.....
1933.....
1932.....
1931.....
1930.....
1929.....

... THIS WEEK'S MARKET NEWS ...

STEEL OPERATIONS

... Industry rate lower at 61 per cent, Pittsburgh off four points

ALTHOUGH steel ingot production in some districts is moderately higher this week, gains are offset by losses so that the rate for the industry is estimated at 61 per cent, a half point below that of last week. Much of the drop is accounted for by the fact that the PITTSBURGH district operating rate has declined four points to 58 per cent, the lowest figure in the downward movement, which set in last November. Other losses are in the Cleveland-Lorain district which is down two points to 62 per cent; in the BIRMINGHAM district, which is off three points to 78 per cent, and in the ST. LOUIS and NEW ENGLAND areas.

Gains, however, have been scored in the CHICAGO, YOUNGSTOWN, WHEELING-WERTON and DETROIT districts. Current operations in DETROIT averaging 78 per cent, are not expected to remain at as high a level much longer.

NEW BUSINESS

... Improvement in domestic buying plus export trade raises level of incoming tonnage

AGGREGATE steel bookings in the past week at PITTSBURGH, including domestic and foreign orders, have been in sufficient volume to sustain at least a 50 per cent of capacity ingot rate. About a month ago incoming business would have supported no more than 40 to 45 per cent ingot rate. A slight but none-the-less noticeable pick-up has occurred in domestic buying in the past 10 days. The increase in domestic incoming orders has covered sheets, wire, tin plate, and, to some extent, tubular products. This condition undoubtedly reflects seasonal factors.

It is becoming increasingly evident that a further pickup, or at least a sustained level of export demand, will more than offset the halting improvement in domestic buying. In the past several years so-called seasonal factors have not exerted the same amount of influence as formerly and for this reason opinions to the effect that a summer slump will set in within a few months carry no more weight than contrary estimates. However, with automobile companies expected to cur-

tail orders as they finish up the current models, and with new railroad tonnage still a possibility instead of a probability, most producers feel that the burden of supporting current steel operating levels must rest with the export and miscellaneous sources.

Incoming orders at CHICAGO are gradually increasing in volume, and this week new business is coming in at from 50 to 60 per cent of capacity. This upturn has been well diversified, both as to products and industries, and it is difficult to point out any one field in which a pronounced rise is noticeable. Tin plate is probably the best single performer at the moment, and the high rate of activity in that item should be maintained throughout the summer. Backlogs generally are depleted. Three to four weeks' delivery is being quoted by one mill on light hot rolled and flat galvanized; other sheets, however, can be shipped as early as a week to 10 days. Current rail programs will be continued for at least several more months.

For some months the Central of Brazil has been inquiring in this country for more than 40,000 tons of rails and accessories. The Export-Import bank recently announced that it will assist the Inland Steel Co. in the financing of these rails to the extent of \$1,500,000 and it is assumed that Inland will receive this order, though definite commitments have not yet been made. It is still believed that 1940 will see 60,000 to 70,000 cars ordered by the railroads.

A number of export orders for alloy steels have been received in the past week or so, but CHICAGO district orders were unimpressive.

The release of projects involving building steel, line pipe, oil well casing and railroad equipment indicate a seasonal upturn in domestic steel buying, according to sellers at CLEVELAND. Tin plate is moving at a better rate, both for export and domestic use.

Miscellaneous buyers, who at intervals last year were the mainstay of the steel industry, are gradually returning to the market for small tonnages, having worked down their inventories.

The betterment in sales noted a week ago in the PHILADELPHIA district has become more general, with practically every seller sharing in the increase. While on a tonnage basis the improvement has not been especially marked, the diversification of demand, with respect to both consuming channels and

products, is taken to augur well for a continuation of the increase. The cause of the increase is laid to depletion of inventories. Several private surveys of the consumers' stock situation have indicated that while practically all users of steel in the district were covered on March requirements, only a few had sufficient supplies to last through April. Contributing to the recent improvement have been fairly substantial releases of tin plate and automobile steel, as well as moderate gain in forging purchases.

Making the second award under its new six-month purchase plan, the Navy has divided 504 tons of steel for stocks, repairs and new ship construction among three manufacturers. To the Lukens Steel Co. went 107 tons of 144-190-in. plates. To the Carnegie-Illinois Steel Corp. went 321 tons of wide flanged beams and to the Jones & Laughlin Steel Corp. was awarded 76 tons of junior beams.

PIG IRON

... Shipping difficulties hamper exporters ... Domestic buying light

PREFERENCE of shipping companies for bulk cargo which yields them a higher revenue than such "stiff" cargoes as pig iron is increasing the difficulties of pig iron exporters. Considerable export business has been booked but cannot be shipped for many weeks. At the start of the week spread of the war to Norway and Denmark and threats against Sweden further complicated the export situation on which some producers have been growing more dependent.

Some melters in the NEW YORK and other areas report better schedules. Melters' stocks along the Atlantic Seaboard still are regarded as adequate.

Both sales and shipments in the PHILADELPHIA area continue to run ahead of a month ago, but buying is still limited largely to lots of 100 tons and less. The advent of open weather is reducing the backlogs of soil pipe plants and increased melting activity is expected in this direction shortly. Stove and boiler parts makers continue to show small seasonal increases in operations.

Outside of export inquiries which appear more numerous and include several large tonnages, the pig iron

market at CLEVELAND offers very little news. Domestic orders and shipments are maintained at practically the level which prevailed during March. Virtually no change in shipments of foundry coke and pig iron have been noticed at CHICAGO recently. Foundry melt is being maintained at previous levels, and blast furnace operation is also stable. A slight increase in pig iron shipments this month is being predicted. Spot sales at \$23 are being made regularly, but for small tonnages only. Order books of CHICAGO producers and sellers are still well filled.

Moderate improvement in shipment of pig iron recorded during March in the SOUTHERN OHIO district has so far been retained this month. Most melters in that area are now covered for their current needs and are specifying against contracts at virtually the same rate that prevailed in March. Foundry operations show relatively no change. Machine tool melters in SOUTHERN OHIO continue to be aggressively active while automotive and agricultural machinery foundries are in fair production, but stove and heating foundries are unseasonably slow.

... EXPORT TRADE ...

... German invasion of Denmark and Norway creates new problem for American exporters

THE invasion of Denmark and Norway by German armed forces immediately raised new problems for American exporters of steel and other products.

First concern was for shipments that are afloat, but it was believed that if these could not reach their destinations in Scandinavian countries they would be taken over by the British at control ports. Considerable steel is also awaiting shipment to Scandinavia at coast ports in the United States.

Next there is the problem of action to be taken on material now being processed but not yet completed. If material has not yet been rolled, some steel companies are holding up work until the situation becomes clearer.

Ultimately there will be, it is believed, a larger demand for American steel from Norway and possibly also from Sweden, as these countries have been obtaining a large part of their steel imports from Germany.

In shipping circles it is believed that the Norwegian merchant fleet, which

is of considerable size, will be pooled with the British and French merchant fleets and will move under convoy.

Danish business, which has been the least important to the United States of the recent Scandinavian tonnage, will of course be cut off entirely.

United States exports of iron and steel products to Denmark, Norway and Sweden totaled 190,438 tons in 1939, broken down this way: Denmark 1679 tons; Norway, 42,533; Sweden 146,226. These compared with exports in 1938 of 123 tons to Denmark, 12,152 tons to Norway, and 31,418 tons to Sweden.

For the first two months in 1940, total iron and steel exports by products follow:

Sweden—5862 tons pig iron, 2399 tons other plates, 4178 tons non-alloy black sheets, 2316 tons tin plate, 1570 tons wire rods, 302 tons ferromanganese, 450 tons bars, 217 tons hot rolled strip, 405 tons galvanized sheets. Total, 17,699 tons.

Denmark—2213 tons plain structural shapes, 415 tons non-alloy black sheets, 100 tons ferromanganese, 33 tons bars, 45 tons other plates. Total, 2805 tons.

Norway—850 tons pig iron, 4052 tons other plates, 3139 tons non-alloy black sheets, 3131 tons tin plate, 1466 tons wire rods, 1649 tons bars, 1174 tons hot rolled strip, 460 tons galvanized sheets, 996 tons steel wire, 1408 tons plain structural shapes, 430 tons fabricated shapes. Total, 18,755 tons.

Export trade has been considerably more active in the past week or so as a result of the general advance in prices, which has stimulated purchases of material on which lower quotations were outstanding.

SEMI-FINISHED STEEL

... Orders are in better volume at Pittsburgh

SEMI-FINISHED specifications including those for billets, sheet bars, and skelp are at a relatively higher level than a month ago at PITTSBURGH. Export demand figures prominently in the improved demand but no small measure of support is also coming from non-integrated steel makers who have stepped up releases.

New orders for semi-finished steel at CLEVELAND to date this month are slightly behind the volume received in the comparable March period.

BOLTS, NUTS AND RIVETS

... Order volume holding up well

RIVET manufacturers at CLEVELAND report April order volume holding up well, aided by construction of buildings, railroad equipment and ships. Aggregate March business proved better than expected at the start of the month.

April to date in the cap screw industry is running along well after a dip in March from February levels. Some manufacturers expect automotive volume to hold up until June barring unforeseen circumstances. With jobber stocks more unbalanced, resumption of buying can be expected. Improved export demand from South America is offset by losses in Europe.

SHEETS AND STRIP

... Orders running substantially ahead of a month ago

INCOMING sheet and strip business at PITTSBURGH is running substantially ahead of a month ago. While some of this improvement is attributed to automotive buying, the greater part springs from an expansion in demand from miscellaneous consumers. Although it is too early to interpret this condition as the forerunner of a definite upward trend, it is apparent that fresh order volume is definitely on the upgrade for the next month or two at least. Although sheet business has not figured prominently in export tonnages, foreign inquiry for sheets and strip has been expanding recently.

April orders to date at CLEVELAND are practically equal to the incoming volume received in the corresponding part of March. To counteract waning automotive buying, which is likely to remain quiet except for fill-in orders to round out production over the next few weeks on 1940 models, miscellaneous demand is stronger. The return of this class of buyers indicates the reduction of inventories and steel on order and is interpreted as an optimistic factor by flat rolled sellers.

Automobile company suppliers in CHICAGO feel that DETROIT is making some of its final buys at this time, but that if 1940 motor car sales continue at their present rate, these buys may be continued for a period. In virtually no instances do customers have to wait longer than four weeks for delivery of sheets.

Bids on about 250 tons of sheets for

Marine barracks, Philadelphia, brought out a slight concession from published prices from a producer outside the EASTERN PENNSYLVANIA area. No importance is attached to this concession, however, as district automobile parts makers continue to pay full market prices on current orders. Bids have also been taken on 250 tons of sheets for Lewisburg, Pa., prison.

RAILROAD BUYING

... New York Central orders 50 locomotives and 1500 cars

NEW YORK CENTRAL has purchased 50 locomotives of the L-3 Mohawk type of which 35 were placed with American Locomotive Co. and 15 with Lima Locomotive Works. This purchase brings to 136 the number of locomotives bought thus far in 1940.

New York Central has also ordered 1500 hopper cars from Despatch Shops, Inc., a subsidiary. Denver & Rio Grande Western is planning to build 100 stock cars and 10 cabooses in its own shops at Denver. Chicago, Burlington & Quincy will build 160 freight cars in the road's own shops.

Domestic purchases of rolling stock in March totaled 40 locomotives, 1076 freight cars, as compared with 18 locomotives, 1172 freight cars and 15 passenger-train cars in February. First quarter purchases aggregate 86 locomotives, 2457 freight cars and 20 passenger-train cars, contrasted with 74 locomotives, 3007 freight cars and 107 passenger-train cars in the first quarter of 1939.

TUBULAR GOODS

*... Line pipe activity improves
... orders generally are better*

PIPE makers at PITTSBURGH are noting a slight upward trend in standard pipe sales and the same may be said with respect to oil country goods specifications. Miscellaneous line pipe business is holding up fairly well. The Montana Dakota Utilities Co. is expected soon to place orders for 120 miles of various sized pipe totaling about 9000 tons for a line to run from Ft. Peck to Glendive, Mont. Also pending is a 40-mile line involving about 3000 tons for Oklahoma Natural Gas and another 40-mile line involving about 3500 tons of steel for Dow Chemical Co. at Freeport, Tex. Michigan Gas Transmission Co. recently ordered 54 miles of 24-in. pipe for a looping gas line involving about 11,000 tons of steel. The loop will be

laid between Montezuma and Crawfordville, Ind.

CLEVELAND reports excellent prospects in the line pipe market, a flurry of buying of oil well casing and considerable seasonal improvement in merchant pipe. Meanwhile export sales are gratifying and well above the volume being received one year ago.

The Jones & Laughlin Steel Corp. was awarded 21,000 ft. of 10-in. steel pipe for the Bush Street vehicular underpass in Queens Borough, New York.

REINFORCING BARS

... Dam in Texas takes 10,000 tons

REINFORCING steel awards total 13,200 tons, of which 10,000 tons is for the Red River Dam at Denison, Tex.

New reinforcing steel projects call for 4710 tons, including 2500 tons in New York for an East River housing project.

Latest figures on the Panama Canal barracks and officers' quarters indicate that both jobs will require almost 13,000 tons of bars; 4800 tons for the Pacific barracks and 1900 tons for the Atlantic barracks have been awarded. Tucker McClure this week was awarded contracts 1 and 3 totaling about 4700 tons and involving 2200 tons for intermediate work and 2500 tons for the Pacific end of the officers' quarters. J. A. Jones Construction Co., Charlotte, N. C., was awarded about 1400 tons for contract No. 2 to take care of the Atlantic sector of the officers' quarters. With about 6700 tons of bars already placed with a concrete bar producer, there remains to be booked about 6100 tons. This tonnage is expected to be awarded this week.

A considerable number of small projects are underway around CHICAGO, and much of the tonnage going to local fabricators is in lots of less than 100 tons.

PLATES

... Scandinavian situation affects export market

SCANDINAVIA has been one of the most important sources of foreign ship plate business in recent months, and much material was in transit on the water when Germany invaded Denmark and Norway. Shipments to Denmark are now definitely ruled out, but at the time of going to

press, it was uncertain whether shipments could be made to Bergen or other Norwegian points. Meanwhile a number of sizable inquiries are still pending. The whole situation has created a great deal of uncertainty concerning export business, not only in regard to Scandinavian sources, but to other points on the Continent, particularly Holland, one of the steadiest markets for ship plate in the last year or more.

Plate demand at PITTSBURGH has not changed materially in the past week and with backlogs lower, producers could use far more tonnage than is now being booked.

Plate orders of CLEVELAND producers to date this month are more than double those received in the corresponding period of March. A large special order appears responsible for the gain rather than any accumulation of small business.

Plate orders placed in the past week with EASTERN PENNSYLVANIA producers were more numerous than in the preceding week and continue to reflect a widely diversified demand. Export buying has intensified, following a brief lull after prices were advanced to the domestic level. Switzerland closed recently on several thousand tons of boiler plate. Export prices are firm at 2.15c. per lb., f.a.s., for merchant plate, although some orders have been taken lately at prices lower than this, but in all cases these are prices which were outstanding at the time export quotations were raised to the domestic level.

Fabricated steel siphons for a Los Angeles Department of Water and Power projects, involving 2200 tons, were awarded to Consolidated Steel Corp., Los Angeles.

MERCHANT BARS

... Export business a considerable factor in current volume

ORDERS from domestic bar users leveled off in the past week at PITTSBURGH and were it not for support from export demand, aggregate hot rolled bar bookings would be at a considerably lower level. Consumers appear to be working down inventories but, due to leveling off in their own operations, the relative inventory position in some instances is substantially unchanged from a month or two ago.

Contrary to the trend in some other districts, merchant bar producers at CLEVELAND report new orders to date this month showing a gratifying gain over the early part of March. Export business is reported to be a prominent

factor in the gain which aggregates around 50 per cent.

At CHICAGO last week several large tonnages were placed by farm and industrial tractor manufacturers. Auto parts makers are busy and expect to be well occupied for another month or so. Bookings are up moderately from a week and month ago.

STRUCTURAL STEEL

... Small volume and low quotations discouraging to fabricators

FABRICATORS are somewhat disappointed at the volume of new business coming out. It is noted, however, that a pick-up has materialized in export fabricated bookings, the trend of which is on the up-grade.

Low quotations on domestic projects are also a discouraging feature to fabricators.

Fabricated structural steel lettings dropped to 5450 tons from 8750 tons last week. Awards are in small lots and include no order of more than 525 tons.

New structural steel projects were 16,800 tons, a slight gain over last week. New inquiries include 7000 tons in Brooklyn for Long Island Railroad improvements on Atlantic Avenue; 2500 tons for a foundry for the Cincinnati Milling Machine Co., Cincinnati; 2000 tons for caisson gates for the Navy Department at Pearl Harbor, Hawaii, and Bremerton, Wash., and 1700 tons at New York for a viaduct for the New York Central Railroad.

TIN PLATE

... Operations up to 63% and headed higher

TIN plate operations this week are up two points to 63 per cent with every likelihood that a further expansion

will materialize next week. Canning of citrus fruits and juices in some parts of the country has been running ahead of what had been expected, and canners are approaching the regular milk season. A portion of the better flow of specifications to the mills is no doubt due to some anticipatory buying because of the impending steamship rate advance which would, of course, affect the shipment of tin plate to the Pacific Coast.

WIRE PRODUCTS

... Mill operations below general level of entire industry

TOTAL wire sales at PITTSBURGH have increased in the past week with some of the improvement affecting wire rods and merchant wire products. Manufacturers' wire demand is substantially unchanged from a week ago. Merchant wire product producers have about decided that some of the business lost because of weather conditions will not be made up until later in the year, if at all.

At St. Louis nail and fencing trade is quiet, and not much of a revival is expected until farmers are through with the work in the field which is now engaging their attention.

Wire mill operations continue below the general level of the entire steel industry and new business to date this month has been uninspiring except for export demand which remains good, according to producers at CLEVELAND.

Total bookings at CHICAGO are gradually increasing but the improvement has not yet reached an important stage. Local manufacturers of automobile springs are concerned over the DETROIT labor situation. Sellers believe that another week or so of weather such as the Middle West is now enjoying will suffice to begin the long delayed demand from rural jobbers for merchant wire products.

3rd Best 1st Quarter Steel Production Attained

PRODUCTION of open hearth and bessemer steel ingots in the first quarter of this year reached a total of 14,230,373 net tons, one of the three best first quarter showings on record, according to the monthly report released of the American Iron and Steel Institute.

Only in 1929 and 1937 did first quarter steel output exceed the tonnage produced in the first three months of this year. The total for the quarter period just closed represented an average operating rate of 72.12 per cent of capacity and exceeded by nearly one-third the total of 10,716,575 net tons (54.49 per cent of capacity) produced in the first quarter of 1939.

Because of the longer month, steel ingot output of 4,236,050 tons in March was only 3 per cent below the February figure of 4,374,625 tons, despite a seven point drop in rate of operations. The total for March of this year was about 11 per cent over March, 1939, when 3,814,013 tons of steel was produced.

The average tonnage of steel produced per week in March was 956,219 tons. This was nearly 10 per cent below the February weekly average of 1,056,673 tons but exceeded by 11 per cent the March, 1939, average output of 860,951 tons a week.

During March the Steel industry operated at an average of 63 per cent of capacity, compared with 69.62 per cent in February and 56.30 per cent in March a year ago.

White Motor Builds 145 25-ton Trucks for France

CLEVELAND—The White Motor Co. is producing a \$1,250,000 order for 145 huge, 25-ton gasoline transport trucks from the French Government. This order follows recent delivery of 1500 smaller White transports costing \$3,000,000 to the French.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Apr. 9, 1940	Apr. 2, 1940	Mar. 12, 1940	Apr. 11, 1939	1940	1939
Fabricated structural steel awards	5,450	8,750	9,900	23,925	218,760	266,810
Fabricated plate awards	3,870	2,685	3,610	3,470	47,900	49,015
Steel sheet piling awards	420	1,400	1,045	4,060	10,590	18,165
Reinforcing bar awards	13,200	10,100	9,450	4,800	125,220	133,770
Total Letting of Construction Steel ..	22,940	22,935	24,005	36,255	402,470	467,760

FABRICATED STEEL

*... Lettings drop to 5450 tons from 8750 tons last week ...
New projects slightly higher at 18,250 tons, against 16,800
tons in the previous week ... Plate awards call for 3870 tons.*

AWARDS

NORTH ATLANTIC STATES

- 520 Tons, Rochester, N. Y., grade-crossing elimination, to American Bridge Co., Pittsburgh.
- 370 Tons, New York, Civil Aeronautics administration building for Treasury Department, to Bethlehem Fabricators Inc., Bethlehem, Pa.
- 365 Tons, Albany, recreation building, to American Bridge Co., Pittsburgh.
- 340 Tons, Alden, N. Y., grade-crossing elimination, to Bethlehem Steel Co., Buffalo.
- 200 Tons, Joyce, Pa., State highway bridge, to American Bridge Co. Pittsburgh.
- 195 Tons, Lawrence County, Pa., bridge, route 37078, to American Bridge Co., Pittsburgh.
- 180 Tons, Pittsburgh, garage, to Keystone Engineering Co., Pittsburgh.
- 180 Tons, Philadelphia, Philadelphia Zoo, building, to Bethlehem Fabricators, Inc., Bethlehem, Pa.
- 110 Tons, Suffolk County, N. Y., State bridge, to American Bridge Co., Pittsburgh.
- 105 Tons, Saratoga County, N. Y., State highway bridge, to Fort Pitt Bridge Works Co., Pittsburgh.
- 100 Tons, Springfield, Vt., foundry addition, to Lyons Iron Works, Inc., Manchester, N. H.

THE SOUTH

- 525 Tons, Hays County, Tex., bridge FAP-8 (5), to Alamo Iron Works, San Antonio, Tex.
- 170 Tons, Scurry County, Tex., bridge, to Fort Worth Structural Steel Co., Fort Worth, Tex.
- 130 Tons, Salem, Va., bridge project 562, to Virginia Bridge Co., Roanoke, Va.

CENTRAL STATES

- 250 Tons, Cleveland, die storage building for Aluminum Co. of America, to Ingalls Iron Works Co., Birmingham.
- 250 Tons, Elyria, Ohio, Elyria Foundry Division, Industrial Brownhoist Corp., to Republic Structural Iron Works, Cleveland (previously reported to Builders Structural Steel Co.)
- 200 Tons, Fairmont City, Ill., State highway bridge, to Midland Structural Steel Co., Cicero, Ill.
- 130 Tons, Peoria, Ill., State hospital, to Illinois Steel Bridge Co., Jacksonville, Ill.
- 110 Tons, Aurora, Ill., factory building for All-Steel-Equipment Co., to Joseph T. Ryerson & Son, Inc., Chicago.
- 100 Tons, Cleveland, Socialer Turnverein hall to Fort Pitt Bridge Works.

WESTERN STATES

- 300 Tons, Vancouver, Wash., transmission towers for line to plant of Aluminum Co. of America, to Lehigh Structural Steel Co., Allentown, Pa., through Fritz Ziebarth, Long Beach, Cal., contractor.
- 300 Tons, Vancouver, British Columbia, exposition buildings, to Dominion Bridge Co., Vancouver, B. C.
- 295 Tons, South Pasadena, Cal., undercrossings of Southern Pacific and Atchison, Topeka, & Santa Fe tracks and Fremont Avenue, to Consolidated Steel Corp., Los Angeles, through Oscar Oberg, Los Angeles.
- 150 Tons, Los Angeles, Moorpark Street bridge, to Minneapolis-Moline Power Implement Co., Los Angeles, through Edward Green, Los Angeles, contractor.
- 120 Tons, Los Angeles, repair shop building for Department of Water and Power, to Bethlehem Steel Co., Los Angeles, through Westcott, Stoker, & Brown, Los Angeles, contractor.
- 100 Tons, Wilmington, Cal., Great Lakes Carbon Corp. plant, to Pacific Iron & Steel Co., Los Angeles.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 7000 Tons, Brooklyn, Long Island Railroad Atlantic Avenue improvements.
- 1700 Tons, New York, New York Central viaduct, 11th Avenue and 35th Street; bids April 15.

- 600 Tons, Syracuse, N. Y., Delaware, Lackawanna & Western grade elimination; bids April 23.
- 550 Tons, Wilmington, Del., apartment building for E. J. Frankel.
- 300 Tons, Buffalo, unit for Hewitt Rubber Co.; bids April 12.
- 220 Tons, Newark, N. J., department store building for Prudential Life Insurance Co.
- 180 Tons, Wilkes-Barre, Pa., pumping stations.
- 100 Tons, East Boston, aircraft shop and school.

CENTRAL STATES

- 2500 Tons, Cincinnati, foundry buildings for Cincinnati Milling Machine Co.
- 540 Tons, Macomb County, Mich., factory and office building for Soss Mfg. Co.
- 275 Tons, Youngstown, mill building for General Fireproofing Co., Gillmore-Carmichael-Olson Co., Cleveland, general contractor.
- 225 Tons, Chicago, elementary school; bids April 16.
- 200 Tons, St. Louis, overpass at Missouri Pacific tracks and Gravois Avenue.
- 200 Tons, Sleepy Eye, Minn., State bridge No. 5599.
- 180 Tons, Ashtabula County, Ohio, State project No. 28; bids April 19.
- 175 Tons, Detroit, theater building for Royal Theater Co.
- 120 Tons, Newark, Ohio, office, service and garage building for Ohio Power Co.
- 100 Tons, Clermont County, Ohio, State project No. 29; bids April 19.
- 100 Tons, Harrison County, Ohio, State project No. 30; bids April 19.

REINFORCING STEEL

... Awards of 13,200 tons; 4710 tons in new projects

AWARDS

ATLANTIC STATES

- 450 Tons, Philadelphia, Navy Yard, shipways No. 2, to Bethlehem Steel Co., Bethlehem, Pa., through Ralph Herzog, contractor.
- 460 Tons, Queens, N. Y., vehicular underpass at Bush Street connection, to Jones & Laughlin Steel Corp., New York.
- 146 Tons, Atlantic City, N. J., hospital, to Bethlehem Steel Co., Bethlehem, Pa.

SOUTH AND CENTRAL

- 10,000 Tons, Denison, Tex., Red River dam, to Sheffield Steel Corp., Kansas City, Mo.
- 495 Tons, Chicago, customs house, addition to Calumet Steel Co., Chicago.
- 360 Tons, Muskegon Heights, Mich., filtration plant, to Truscon Steel Co., Youngstown.
- 150 Tons, Champaign, Ill., Swift & Co., grain storage bins, to Calumet Steel Co., Chicago.
- 135 Tons, Des Moines, Iowa, Spencer-Kellogg Co., plant, to Calumet Steel Co.

WESTERN STATES

- 315 Tons, Los Angeles, repair shop building for Department of Water and Power to Soule Steel Co., Los Angeles, through Westcott, Stoker, & Brown, Los Angeles, contractors.
- 250 Tons, San Francisco, quartermaster's list, Fort Mason, for Alaskan air base, to Columbia Steel Co., San Francisco.
- 100 Tons, Ogden, Utah, telephone building, to Colorado Fuel & Iron Corp., Denver.

CANAL ZONE

- 700 Tons, Panama Canal, this is additional tonnage not included last week when

WESTERN STATES

- 2000 Tons, Pearl Harbor, T. H., and Bremerton, Wash., caisson gates for Navy; bids April 24.
- 700 Tons, Spokane, Wash., court house-custom house extension; bids April 17.
- 280 Tons, Sunnyvale, Cal., technical service building at Moffett Field; Carl Swenson, San Jose, Cal., contractor.

FABRICATED PLATES

AWARDS

- 2200 Tons, Los Angeles, siphon replacement for Department of Water and Power (Specifications 3315), to Consolidated Steel Corp., Los Angeles, through J. F. Shea Co., Inc., Los Angeles, contractor.
- 1010 Tons, Vancouver, Wash., pot shells and cradles for Aluminum Co. of America, to Puget Sound Machinery Depot, Seattle, Wash.
- 500 Tons, Parker, Ariz., 12 radial gates for dam, to American Bridge Co.
- 160 Tons, Lake Charles, La., tanks for Mathieson Alkali Works, to Ingalls Iron Works Co., Birmingham.

PENDING PROJECTS

- 550 Tons, Odair, Wash., heating and seat plate assemblies (Specification 907), for Bureau of Reclamation.
- 540 Tons, Odair, Wash., penstock coaster gates (Specification 905), for Bureau of Reclamation.
- 250 Tons, Earp, Cal., Bureau of Reclamation, floating bulkhead gates; bids April 29.
- 120 Tons, Odair, Wash., bulkhead gate tracks (Specification 1351-D), for Bureau of Reclamation.

SHEET PILING

AWARDS

- 1300 Tons, Cleveland, Cuyahoga River improvement, contract No. 23, L. A. Wells Construction Co., Cleveland, low bidder.
- 575 Tons, Cleveland, Cuyahoga River improvement, cut No. 1, contract No. 24; Bids April 11 (also 94 tons of steel accessories).
- 540 Tons, Cleveland, Cuyahoga River improvement; cut No. 8, contract No. 33; bids April 11.
- 420 Tons, Kansas City, flood control project, United States Engineers, to Inland Steel Co., Chicago.

6000 tons was reported going to Bethlehem Steel Co. for Pacific sector of barracks and officers' quarters. Atlantic sector of officers' quarters (J. A. Jones, contractor), is yet to be let.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 2500 Tons, New York, superstructure, East River houses; bids due April 30.
- 1300 Tons, Washington, Gravelly Point airport; McCloskey & Co., low bidder. Supplementary bids to be taken April 11—only three low bidders to submit bids as bids overrun appropriation.
- 300 Tons, New Bedford, Mass., housing project.
- 230 Tons, New York, WPA sewers, Manhattan and Bronx; bids through Treasury Procurement Division.
- 200 Tons, Brooklyn, sewers, 69th Avenue to Utopia Parkway, bids April 11.
- 100 Tons, Webster Township, N. H., dam.
- 100 Tons, Springfield, Vt., State road.

CENTRAL STATES

- 495 Tons, Franklin and Madison Counties, Ohio, project No. 23, Robert J. Dienst, Columbus, low bidder.
- 360 Tons, Indianapolis, flood wall, United States Engineers; bids April 24.
- 350 Tons, St. Louis, overpass at Missouri Pacific tracks and Gravois Avenue; bids April 26.
- 250 Tons, Cleveland, public opening for city; Patterson-Leitch Co., Cleveland, low bidder.
- 185 Tons, Brown and Clermont Counties, Ohio, project No. 26; Crumley, Jones & Crumley, Cincinnati, low bidders.
- 100 Tons, Springfield, joists for Woolworth store; Paugh & Brown Co., Cleveland, low bidder on general contract.

WESTERN STATES

- 320 Tons, Kremmling, Colo., Green Mountain power plant (Invitation B-46196-A); bids April 15.

...NON-FERROUS...

... New developments abroad spur demand for non-ferrous metals ... Copper prices, domestic and export, stronger ... March spelter shipments decline to 51,095 tons; stocks higher.

NEW YORK, April 9—The startling change in the situation in Europe on Tuesday lifted the non-ferrous markets out of the doldrums with unexpected sharpness and bullish sentiment completely overcame the bearish atmosphere which has pervaded the market for the past several months. In the new trend abroad many traders found the implication of a more intensive prosecution of the war and the death of hopes that the war might be of short duration. Domestic consumers, in anticipation of increased demands for non-ferrous metals from the belligerents, were fairly ac-

tive on Tuesday, particularly in nearby positions. Copper demand, which was extremely dull all the past week, spurted sharply on Tuesday, and open market prices rapidly approached the producer-price level of 11.50c. per lb., delivered Connecticut Valley. Previously, custom smelters and resale interests had been asking 11.25c. Export inquiry did not share to any great degree in the increased copper demand, but prices rose sympathetically to around 11.50c. per lb., f.a.s., this morning for nearby delivery. Producers' quotations were unchanged all week at 11.50c.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 3	Apr. 4	Apr. 5	Apr. 6	Apr. 8	Apr. 9
*Copper, Electrolytic ¹	11.50	11.50	11.50	11.50	11.50	11.50
Copper, Lake	11.50	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	45.50	45.50	45.50	46.00	47.00	47.00
Zinc, East St. Louis ²	5.75	5.75	5.75	5.75	5.75	5.75
Lead, St. Louis ³	4.85	4.85	4.85	4.85	4.85	4.85

* Mine producers' quotations only.

¹ Delivered Conn. Valley. Deduct ¼c. for New York delivery. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits, pig	47.75c.	47.75c.
Copper, Lake	13.25c.	12.625c.
Copper, electro	12.75c.	12.625c.
Copper, castings	12.375c.	12.375c.
*Copper sheets, hot-rolled	20.12c.	20.12c.
*Yellow brass sheets ..	18.31c.	18.31c.
*Seamless brass tubes..	21.06c.	21.06c.
*Seamless copper tubes.	20.62c.	20.62c.
*Yellow brass rods	14.26c.	14.26c.
Zinc slabs	7.10c.	7.75c.
Zinc sheets, No. 9 casks	12.00c.	13.35c.
Lead, American pig ...	6.00c.	5.50c.
Lead, bar	7.95c.	8.25c.
Lead, sheets, cut	8.25c.	8.25c.
Antimony, Asiatic	16.00c.	17.00c.
Alum., virgin, 99 per cent plus	20.50c.	21.50c.
Alum., No. 1 remelt., 98 to 99 per cent	18.00c.	18.50c.
Solder, ½ and ¼	29.625c.	29.00c.
Babbitt metal, anti-friction grade	19.85c.	19.00c.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33¼; on brass sheets and rods, 40; on brass tubes, 33¼, and copper tubes, 40.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible ..	9.25c.	9.875c.
Copper, hvy. and wire..	8.25c.	8.625c.
Copper, light and bottoms	7.25c.	7.75c.
Brass, heavy	5.00c.	5.50c.
Brass, light	4.125c.	4.875c.
Heavy machine composition	7.75c.	8.375c.
No. 1 yel. brass turnings	4.75c.	5.75c.
No. 1 red brass or composition turnings	7.25c.	8.75c.
Lead, heavy	4.00c.	7.375c.
Cast aluminum	7.75c.	8.75c.
Sheet aluminum	13.00c.	14.00c.
Zinc	2.75c.	4.00c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 19c.-20c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICK-SILVER, \$180 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 11.75c. a lb.

Lead

Consumer demand improved substantially in the first two days of the current week, although buying all last week was in very poor volume. The new interest in lead centered chiefly in May and was not especially broad. However, in view of the situation abroad, sellers expect a continued improvement in sales and a more diversified demand. May requirements are about one-third covered, while April needs are close to 65 per cent bought. Prices remain unaltered at 5c. per lb., New York.

Zinc

Prime Western sales in the past week were 1400 tons, as compared with 1515 in the previous period, while shipments in the two periods were 3028 and 4200 tons respectively. While spelter demand did not improve at noticeably as lead and copper in the first two days of the present week, a better tone was in evidence throughout the market. Quotations were unchanged all week at 6.14c. per lb., New York. Shipments of slab zinc in March were 51,095 tons, as compared with 53,048 in February and 45,291 in March, a year ago. March production rose to 57,620 tons from 54,532 in the previous month. Stocks at the end of March stood at 73,611 tons, as against 67,086 at the close of February and 127,985 tons at the end of March, 1938.

Tin

Intensification of the war in Europe brought out a heavy consumer demand for nearby tin today, after a week of desultory trading. This buying wave advanced prices a full cent today to 47c. per lb., for prompt Straits, New York, as compared with 46c. on Monday and 45.875c. on Tuesday, a week ago. Little interest has been indicated in futures, as consumers display a strong inclination toward having the physical tin on hand, rather than a contract to futures subject to the vicissitudes of war time shipping. Values in London rose sympathetically this morning, with cash standards being priced at £250 15s. As compared with £248 15s. a week ago.

March Average Prices

The average prices of the major non-ferrous metals in March, based on quotations appearing in THE IRON AGE, were as follows:

	Per Lb.
Electrolytic copper, Conn. Valley	11.50c.*
Lake copper, Eastern delivery..	11.50c.
Straits tin, spot, New York.....	47.07c.
Zinc, East St. Louis.....	5.75c.
Zinc, New York.....	6.14c.
Lead, St. Louis.....	5.04c.
Lead, New York.....	5.19c.

*Mine producers only.

IRON AND STEEL SCRAP

... Price decline at Chicago lowers composite 4c. to \$16.04.

APRIL 9—A drop of 12½c. in the average price of No. 1 steel has taken place in Chicago as result of two mill sales and consequent narrowing of the range in quotations there. Following a sale of 5000 tons of No. 1 heavy melting steel at Buffalo, the market is off 50c., and at St. Louis the market is still feeling the weakening effect of a sale of 5000 tons of No. 2 made last week. Birmingham prices have dropped because of the lack of mill orders. A small sale of no significance has been made under the market at Pittsburgh but nowhere can strength be discerned this week except in some cast grades and railroad specialties.

The downward trend in the scrap composite price is continued, but the fall amounts to only 4c. this week to a \$16.04 as compared with a drop of 21c. the week before. News of the spread of hostilities in Europe has yet to be digested here, the ultimate effect upon steel markets being the determining factor in any sentiment that might develop in the scrap industry. The first reaction is bullish, however.

Pittsburgh

Market sentiment here has strengthened slightly, due almost entirely to European war news. Some brokers who had looked for a softer market are now covering on shortages. A small sale of No. 1 steel into consumption was made in the past week at \$15.75 but the amount was not considered sufficient to change present quotations on this grade. No. 1 heavy melting remains unchanged at \$16.50, with some brokers and buyers believing the bottom has been reached for the time being. Although quotations for major scrap products in this area approximate the level in other districts, a condition which did not exist a few years ago, this condition is not considered unusual because the largest scrap consumer in the district has not purchased a sizable tonnage in the open market for more than a year.

Chicago

In the past week two Chicago district mills have purchased heavy melting steel at \$15.25, down 25c. from the previous mill sale. Brokers are able to buy from dealers at less than \$15.25 so No. 1 is quoted this week at \$15 to \$15.25. In contrast to the steel grades, which have been weak for some time, the cast grades and some of the railroad specialties are showing strength. Material is moving into this district at a gradually increasing rate and scrap should be readily available when spring is more advanced.

Philadelphia

Conditions here are virtually unchanged from a week ago, with mills showing little interest in making new commitments and dealers reluctant to release supplies to brokers. Only price change this week is in No. 2 steel, which is now quoted at a flat \$15.50, as compared with \$15.50 to \$16 in the previous week. Exporters expect to load two cargoes for Italy this month, totaling about 8000 tons. The first boat, due on the 15th, will take on about 3000 tons of scrap, and the second boat, due to arrive at the end of the month, will load 5000 tons.

Youngstown

With not too much scrap coming out and mills finding difficulty picking up even small lots of No. 1 at \$16.50, the market here remains deadlocked. Railroad lists failed to affect nominal published prices. There is a possibility of further clarification within the next week.

Cleveland

Buying is of only small consequence here. Blast furnace grades are moving on old orders and small amounts of No. 1 have been bought to replace expiring orders, a policy established some months ago and one which helps smooth out the market and removes the excitement accompanying large tonnage purchases. The New York Central is understood to have obtained \$16.75 to \$17 for its steel for several points, including 500 tons for Cleveland. The tendency here Tuesday was to hold back awaiting clarification of the European situation.

Buffalo

No. 1 heavy melting steel is off 50c. this week with a sale of 5000 tons of No. 2 steel to a large district consumer at a price ranging between \$14 and \$14.50. Kindred grades take their customary differential. At the same time sales in the cast market have increased values there 50c., No. 1 machinery cast being quoted at \$18 to \$18.50 and cupola, \$17 to \$17.50.

St. Louis

The scrap market is easier this week, prices being reduced from 25c. to 50c. a ton for the most part. The recent sale of No. 2 heavy melting steel has caused a reduction of 25c. in that grade, affecting other items on the list. Mills are said to be showing a little more interest in the market, and are willing to take on material at price concessions. Railroad lists: Louisville & Nashville, 4500 tons; Wabash, 1600 tons; Gulf Coast Lines, 1400 tons; Missouri Pacific, 1300 tons; Ann Arbor, 300 tons; Alton, 490 tons.

Cincinnati

Scrap weakness in other areas spread to this district last week, bringing dealers' bids on all items down 25c. Some small trading with local mills during the past week was reported at lower prices

and the general apathy of consumers has accentuated market inactivity. Dealers' trading was small and shipments eased a trifle.

Birmingham

Steel scrap dropped 50c. with the coming of April, the quotations now being \$14.50 for No. 1 steel and \$13.50 for No. 2. Even at these figures, the market does not give evidence of revival. As for cast scrap, the market is dragging. Exports at Mobile and New Orleans have improved.

The Tennessee company is definitely out of the scrap market. This company was absent from 1933 to 1939 (autumn) and its participation in the market is one reason for the market strength during the latter part of 1939 and the early part of 1940.

New York

All vessels that were loading here last week have cleared port and none are expected for a week or two. Consequently the export market has subsided materially and no exporter is offering more than \$13.50 for No. 1 steel delivered to barges. Shipments to eastern Pennsylvania have likewise quieted down. Prices for material on cars are unchanged from a week ago.

Boston

Large New England consumers apparently are not interested in scrap, and foundry buying of cast is slow, although some signify they might buy at a price. Pennsylvania consumers are mildly interested in steel turnings, skeleton and breakable cast, but little else. Thus the domestic market continues in a drifting stage. The Washburn Wire Co., Phillipsdale, R. I., is operating only one furnace. Exporters have good orders on hand, but the market is not nearly as active as a month ago, due to a lack of vessel space. While No. 2 steel is generally quoted at \$14.50 a ton delivered dock, some business has been put through at \$14.25.

Detroit

The bullish sentiment which had prevailed in some quarters was deflated when the much-discussed Ford buy failed to develop. The motor manufacturer had indicated the probability of buying open-hearth material, but it is understood now that adjustments have been made and scrap requirements filled without going into the open market. Further cause for a switch to a bearish sentiment is an apparent lack of new orders from the major consumer in this area, even though held-up shipments to the mill started moving freely again April 1. In addition, it is anticipated that consumption will be materially decreased, with a substantial drop in the number of open hearths operating expected to occur shortly.

Toronto

Improvement in supplies to dealers and demand from consumers is reported for the week by local iron and steel scrap dealers, while prices remained firm but unchanged. While large tonnages of most lines of scrap are held in northern Ontario, deliveries have been at a standstill for several months, owing to weather conditions.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$16.00 to \$16.50
Railroad heavy melting	17.00 to 17.50
No. 2 heavy melting	14.50 to 15.00
Railroad scrap rails	17.50 to 18.00
Rails 3 ft. and under	20.00 to 21.00
Comp. sheet steel	16.00 to 16.50
Hand bundled sheets	15.00 to 15.50
Heavy steel axle turn.	14.00 to 14.50
Machine shop turnings	10.00 to 10.50
Short, shov. turnings	11.50 to 12.00
Mixed bor. & turn.	8.75 to 9.25
Cast iron borings	8.75 to 9.25
Cast iron carwheels	18.50 to 19.00
Heavy breakable cast	15.00 to 15.50
No. 1 cupola cast	17.50 to 18.00
RR. knuckles & coup.	20.00 to 20.50
Rail coil springs	20.50 to 21.00
Rail leaf springs	20.50 to 21.00
Rolled steel wheels	20.50 to 21.00
Low phos. billet crops	20.50 to 21.50
Low phos. punchings	20.00 to 20.50
Low phos. heavy plate	19.50 to 20.00
Railroad malleable	21.00 to 21.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$16.50 to \$17.00
No. 2 hvy. mltng. steel	15.50 to 16.00
Hydraulic bund., new	16.50 to 17.00
Hydraulic bund., old	14.00 to 14.50
Steel rails for rolling	20.50 to 21.00
Cast iron carwheels	20.00 to 20.50
Hvy. breakable cast	18.50
No. 1 cupola cast	20.00 to 20.50
Mixed yard (f'd'y) cast	16.50
Stove plate (steel wks.)	15.00 to 15.50
Railroad malleable	21.00 to 22.00
Machine shop turn.	9.50 to 10.00
No. 1 blast furnace	9.00 to 9.50
Cast borings	10.50 to 11.00
Heavy axle turnings	14.00 to 14.50
No. 1 low phos. hvy.	21.00 to 21.50
Couplers & knuckles	21.00 to 21.50
Rolled steel wheels	21.00 to 21.50
Steel axles	21.50 to 22.00
Shafting	22.00 to 22.50
Spec. iron & steel pipe	16.00 to 16.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton	
Hvy. mltng. steel	\$15.00 to \$15.25
Auto. hvy. mltng. steel	
alloy free	14.00 to 14.25
No. 2 auto steel	12.00 to 12.50
Shoveling steel	15.00 to 15.25
Factory bundles	14.50 to 14.75
Dealers' bundles	13.00 to 13.25
No. 1 busheling	14.00 to 14.25
No. 3 busheling, old	7.00 to 7.50
Rolled carwheels	17.50 to 18.00
Railroad tires, cut	18.00 to 18.50
Railroad leaf springs	17.25 to 17.75
Steel coup. & knuckles	17.50 to 18.00
Axle turnings	14.00 to 14.50
Coil springs	18.50 to 19.00
Axle turn. (elec.)	16.00 to 16.50
Low phos. punchings	18.00 to 18.50
Low phos. plates 12 in. and under	17.50 to 18.00
Cast iron borings	8.50 to 9.00
Short shov. turn.	9.00 to 9.50
Machine shop turn.	8.50 to 9.00
Rerolling rails	18.00 to 18.50
Steel rails under 3 ft.	17.75 to 18.25
Steel rails under 2 ft.	18.50 to 19.00
Angle bars steel	17.50 to 18.00
Cast iron carwheels	16.50 to 17.00
Railroad malleable	18.50 to 19.00
Agric. malleable	13.75 to 14.25
Per Net Ton	
Iron car axles	21.00 to 21.50
Steel car axles	20.00 to 20.50
Locomotive tires	14.00 to 14.50
Pipes and flues	10.50 to 11.00
No. 1 machinery cast	14.50 to 15.00
Clean auto. cast	14.50 to 15.00
No. 1 railroad cast	14.00 to 14.50
No. 1 agric. cast	12.50 to 13.00
Stove plate	9.00 to 9.50
Grate bars	9.50 to 10.00
Brake shoes	10.00 to 10.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$16.00 to \$16.50
No. 2 hvy. mltng. steel	15.00 to 15.50
Low phos. plate	19.00 to 19.50
No. 1 busheling	15.25 to 15.75
Hydraulic bundles	15.50 to 16.00
Machine shop turn.	10.00 to 10.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$15.50 to \$16.00
No. 2 hvy. mltng. steel	14.50 to 15.00
Comp. sheet steel	15.00 to 15.50
Light bund. stampings	12.50 to 13.00
Drop forge flashings	13.50 to 14.00
Machine shop turn.	8.50 to 9.00
Short shov. turn.	9.50 to 10.00
No. 1 busheling	14.25 to 14.75
Steel axle turnings	13.50 to 14.00
Low phos. billet and bloom crops	20.50 to 21.00
Cast iron borings	9.50 to 10.00
Mixed bor. & turn.	9.50 to 10.00
No. 2 busheling	9.50 to 10.00
No. 1 cupola cast	16.50 to 17.00
Railroad grate bars	13.00 to 13.50
Stove plate	13.00 to 13.50
Rails under 3 ft.	20.00 to 20.50
Rails for rolling	19.50 to 20.00
Railroad malleable	19.00 to 19.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$15.50 to \$16.00
No. 2 hvy. mltng. steel	14.00 to 14.50
Scrap rails	17.00 to 17.50
New hvy. b'ndled sheets	14.00 to 14.50
Old hydraulic bundles	12.00 to 12.50
Drop forge flashings	14.00 to 14.50
No. 1 busheling	14.00 to 14.50
Machine shop turn.	9.50 to 10.00
Shov. turnings	12.00 to 12.50
Mixed bor. & turn.	10.00 to 10.50
Cast iron borings	10.00 to 10.50
Knuckles & couplers	20.00 to 21.00
Coil & leaf springs	20.00 to 21.00
Rolled steel wheels	20.00 to 21.00
No. 1 machinery cast	18.00 to 18.50
No. 1 cupola cast	17.00 to 17.50
Stove plate	14.50 to 15.00
Steel rails under 3 ft.	21.50 to 22.00
Cast iron carwheels	17.50 to 18.00
Railroad malleable	19.00 to 19.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. mltng.	\$14.25 to \$14.75
No. 1 hvy. mltng.	13.75 to 14.25
No. 2 hvy. mltng.	12.75 to 13.25
No. 1 locomotive tires	14.75 to 15.25
Misc. stand. sec. rails	15.00 to 15.50
Railroad springs	16.00 to 16.50
Bundled sheets	8.50 to 9.00
No. 1 busheling	13.00 to 13.50
Cast bor. & turn.	5.00 to 5.50
Machine shop turn.	6.00 to 6.50
Heavy turnings	9.25 to 9.75
Rails for rolling	17.00 to 17.50
Steel car axles	18.00 to 18.50
No. 1 RR wrought	10.00 to 10.50
No. 2 RR wrought	12.50 to 13.00
Steel rails under 3 ft.	18.00 to 18.50
Steel angle bars	15.00 to 15.50
Cast iron carwheels	15.50 to 16.00
No. 1 machinery cast	15.75 to 16.25
Railroad malleable	15.50 to 16.00
Breakable cast	13.50 to 14.00
Stove plate	10.50 to 11.00
Grate bars	9.50 to 10.00
Brake shoes	10.00 to 10.50

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	\$12.25 to \$12.75
No. 2 hvy. mltng. steel	10.25 to 10.75
Scrap rails for mltng.	16.75 to 17.25
Loose sheet clippings	7.75 to 8.25
Hydrau. b'ndled sheets	11.75 to 12.25
Cast iron borings	3.50 to 4.00
Machine shop turn.	4.75 to 5.00
No. 1 busheling	8.75 to 9.25
No. 2 busheling	2.75 to 3.00
Rails for rolling	18.25 to 18.75
No. 1 locomotive tires	13.75 to 14.25
Short rails	18.75 to 19.25
Cast iron carwheels	14.25 to 14.75
No. 1 machinery cast	15.75 to 16.25
No. 1 railroad cast	13.75 to 14.25
Burnt cast	7.50 to 8.00
Stove plate	7.50 to 8.00
Agricul. malleable	12.25 to 12.75
Railroad malleable	15.25 to 15.75
Mixed hvy. cast	13.25 to 13.75

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	\$14.50
No. 2 hvy. melting steel	13.50
No. 1 busheling	14.00
Scrap steel rails	15.00
Steel rails under 3 ft.	16.00
Rails for rolling	16.50
Long turnings	5.00
Cast iron borings	7.50
Stove plate	10.00
Steel axles	18.00
No. 1 RR wrought	14.00

No. 1 cast	\$16.00
No. 2 cast	12.50
Cast iron carwheels	13.00
Steel car wheels	16.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	\$12.50 to \$13.00
No. 2 hvy. mltng. steel	11.50 to 12.00
Borings and turnings	6.75 to 7.25
Long turnings	7.25 to 7.75
Short shov. turnings	8.25 to 8.75
No. 1 machinery cast	15.50 to 16.00
Automotive cast	16.25 to 16.75
Hvy. breakable cast	13.00 to 13.50
Stove plate	9.25 to 9.75
Hydraul. comp. sheets	13.75 to 14.25
New factory bushel.	12.00 to 12.50
Sheet clippings	8.50 to 9.50
Flashings	12.00 to 12.50
Low phos. plate scrap	13.75 to 14.25

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	\$12.50 to \$13.00
No. 2 hvy. mltng. steel	11.00 to 11.50
Hvy. breakable cast	14.00 to 14.50
No. 1 machinery cast	16.00 to 16.50
No. 2 cast	12.50 to 13.00
Stove plate	10.50 to 11.00
Steel car axles	19.00 to 20.00
Shafting	19.00 to 20.00
No. 1 RR wrought	14.00 to 15.00
No. 1 wrought long	12.50 to 13.00
Spec. iron & steel pipe	13.50 to 14.00
Rails for rolling	15.50 to 16.00
Clean steel turnings*	5.00 to 5.50
Cast borings*	5.00 to 5.50
No. 1 blast furnace	5.00 to 5.50
Cast borings (chem.)	Nominal
Unprepared yard scrap	6.50 to 7.00
Light iron	4.50 to 5.00
Per gross ton delivered local foundries:	
No. 1 machin. cast	\$17.00 to \$18.50
No. 2 cast	16.50 to 17.00

* \$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	\$13.00 to \$13.25
Machine shop turn.	4.15
Mixed bor. & turn.	3.15
Bun. skeleton long	8.25 to 8.40
Shafting	17.00 to 17.25
Stove plate	9.75 to 10.00
Cast bor. chemical	8.00 to 8.50
Per gross ton delivered consumers' yards:	
Textile cast	\$17.50 to \$19.00
No. 1 machine cast	17.50 to 19.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel	\$13.25
No. 2 steel	12.25

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	\$12.00	\$12.00	\$11.00
No. 2 hvy. mltng. steel	11.00	11.00	10.00
Bundles	10.00	10.00	9.00

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	\$11.50	\$11.00
No. 1 hvy. mltng. steel	11.00	10.50
No. 2 hvy. mltng. steel	9.75	9.25
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.25	6.75
Cast borings	6.75	6.25
Machinery cast	17.50	17.00
Dealers' cast	16.50	16.00
Stove plate	12.50	12.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel	\$13.50
No. 2 hvy. mltng. steel	\$11.50 to 12.00
No. 2 cast	12.00 to 12.50
Stove plate	10.00 to 10.50

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel	\$15.50
No. 2 hvy. mltng. steel	14.50
Rail (scrap)	\$15.50 to 15.75
Stove plate	8.25 to 8.50

Philadelphia, delivered alongside boats, Port Richmond

No. 1 hvy. mltng. steel	\$16.00
No. 2 hvy. mltng. steel	14.75

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are effected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher f.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Rerolling\$34.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.
Per Gross Ton
Open hearth or bessemer\$34.00

Skelp

Pittsburgh, Chicago Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Lb.
Pittsburgh, Chicago or Cleveland 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.45c.
Galveston 2.25c.
9/32 in. to 47/64 in. \$3 a net ton higher. Quantity extras apply.

SOFT STEEL BARS

Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.15c.
Detroit, delivered 2.25c.
Duluth 2.25c.
Philadelphia, delivered.. 2.47c.
New York 2.49c.
On cars dock Gulf ports 2.50c.
On cars dock Pacific ports 2.75c.

RAIL STEEL BARS

(For merchant trade)
Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.05c.
On cars dock Tex. Gulf ports 2.40c.
On cars dock Pacific ports 2.65c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. 1.70c. to 1.90c.*
Detroit, delivered 1.80c. to 2.00c.*
On cars dock Tex. Gulf ports 2.20c. to 2.25c.*
On cars dock Pacific ports 2.20c. to 2.25c.*

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)
Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham. 1.70c. to 1.90c.*
Detroit, delivered 1.80c. to 2.00c.*
On cars dock Tex. Gulf ports 2.20c. to 2.25c.*

On cars dock

Pacific ports 2.20c. to 2.25c.*
* The so-called published price on new billet reinforcing bars is 2.15c. a lb. f.o.b. major basing points and on rail reinforcing bars is 2.00c. a lb. The price range shown above, however, represents the going prices at the present time.

IRON BARS

Chicago 2.25c.
Pittsburgh (refined) ... 3.75c.

COLD FINISHED BARS AND SHAFTING*

Pittsburgh, Buffalo, Cleveland, Chicago, and Gary 2.65c.
Detroit 2.70c.

* In quantities of 20,000 to 39,999 lb.

PLATES

Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del. 2.10c.
Philadelphia, del'd 2.15c.
New York, del'd 2.29c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg 3.80c.

FLOOR PLATES

Pittsburgh or Chicago. 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham.. 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.
Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill
Standard rails, heavier than 60 lb., per gross ton\$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points
Light rails (from billets) per gross ton..\$40.00
Light rails (from rail steel) per gross ton.. 39.00

Base per Lb.
Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes (per 100 counts) 65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 2.10c.
Detroit, delivered 2.20c.
Philadelphia, delivered. 2.27c.
Granite City 2.20c.
On cars dock Pacific ports 2.60c.
Wrought iron, Pittsburgh 4.10c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 3.05c.
Detroit, delivered 3.15c.
Granite City 3.15c.
Philadelphia, delivered. 3.37c.
On cars dock Pacific ports 3.65c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.
Philadelphia, del'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports 4.00c.
Wrought iron, Pittsburgh 6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

Base per Lb.
Field grade 3.20c.
Armature 3.55c.
Electrical 4.05c.
Motor 4.95c.
Dynamo 5.65c.
Transformer 72 6.15c.
Transformer 65 7.15c.
Transformer 58 7.65c.
Transformer 52 8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary 3.80c.
F.o.b. cars dock Pacific ports 4.50c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland 3.35c.
Detroit, del'd 3.45c.
Granite City 3.45c.
On cars dock Pacific ports 3.95c.

TIN MILL PRODUCTS

Tin Plate

Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary (100 lb.) \$5.00
Standard cokes, Granite City (100 lb.) 5.10

Special Coated Manufacturing Ternes

Per Base Box
Granite City \$4.40
Pittsburgh or Gary ... 4.30

Roofing Terne Plate

(F.o.b. Pittsburgh per Package, 112 Sheets)

20x14 in. 20x28 in.
8-lb. coating
I.C. \$6.00 \$12.00
15-lb. coating
I.C. 7.00 14.00
20-lb. coating
I.C. 7.50 15.00
25-lb. coating
I.C. 8.00 16.00
30-lb. coating
I.C. 8.63 17.25
40-lb. coating
I.C. 9.75 19.50

Black Plate, 29 gage and lighter*
Pittsburgh, Chicago and Gary 3.05c.
Granite City 3.15c.
On cars dock Pacific ports, boxed 4.00c.
*Black plate base price applies to 29 gage within certain width and length limitations.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 2.10c.
Detroit, delivered 2.20c.
On cars dock Pacific ports 2.70c.

Cooperage Stock

Pittsburgh and Chicago 2.20c.

COLD ROLLED STRIP*

Base per Lb.
Pittsburgh, Youngstown or Cleveland 2.80c.
Chicago 2.90c.
Detroit, delivered 2.90c.
Worcester 3.00c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland 2.95c.
Detroit, del'd 3.05c.
Worcester 3.35c.

COLD ROLLED SPRING STEEL

	Pittsburgh	Chicago	Worcester
Carbon 0.26-0.50%	2.80c.	3.00c.	
Carbon 0.51-0.75	4.30c.	4.50c.	
Carbon 0.76-1.00	6.15c.	6.35c.	
Carbon 1.01-1.25	8.35c.	8.55c.	

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade
Per Lb.
Bright wire 2.60c.
Galvanized wire, base .. 2.60c.
Spring wire 3.20c.

To the Trade
Base per Keg
Standard wire nails\$2.55
Coated nails 2.55
Cut nails, carloads 3.85

Base per 100 Lb.
Annealed fence wire\$3.05
Woven wire fence, 15 1/2 gage and heavier base col. 67
Fence posts (carloads), base col. 69
Single loop bale ties, base col. 56
Galvanized barbed wire on 80-rod spools (carloads) base col. 70
Twisted barless wire, base col. 70
Note: Birmingham base same on above items, except spring wire.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe
Base Discounts, f.o.b. Pittsburgh
District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on
wrought iron pipe.

In.	Black Galv.
1/8	56 36
1/4 to 3/8	59 43 1/2
1/2	63 1/2 54
3/4	66 1/2 58
1 to 3	68 1/2 60 1/2

In.	Black Galv.
1/4 & 3/8	+9 +30
1/2	24 6 1/2
3/4	30 13
1 & 1 1/4	34 19
1 1/2	38 21 1/2
2	37 1/2 21

In.	Black Galv.
2	61 52 1/2
2 1/2 & 3	64 55 1/2
3 1/2 to 6	66 57 1/2
7 & 8	65 55 1/2
9 & 10	64 1/2 55
11 & 12	63 1/2 54
2	30 1/2 15
2 1/2 to 3 1/2	31 1/2 17 1/2
4	33 1/2 21
4 1/2 to 8	32 1/2 20
9 to 12	28 1/2 15

In.	Black Galv.
1/8	54 1/2 41 1/2
1/4 to 3/8	56 1/2 45 1/2
1/2	61 1/2 53 1/2
3/4	65 1/2 57 1/2
1 to 3	67 60
1/4 & 3/8	+10 +43
1/2	25 9
3/4	31 15
1 to 2	38 22 1/2

In.	Black Galv.
2	59 51 1/2
2 1/2 & 3	63 55 1/2
3 1/2 to 6	66 1/2 59
7 & 8	65 1/2 56
9 & 10	64 1/2 55
11 & 12	63 1/2 54
2	33 1/2 18 1/2
2 1/2 to 4	39 1/2 25 1/2
4 1/2 to 6	37 1/2 24
7 & 8	38 1/2 24 1/2
9 to 12	32 20 1/2

On butt weld and lap weld steel pipe
jobbers are granted a discount of 5%.
On less-than-carload shipments prices
are determined by adding 25 and 30%
and the carload freight rate to the base
card.

F.o.b. Gary prices are two points lower
discount or \$4 a ton higher than Pitts-
burgh or Lorain on lap weld and one
point lower discount, or \$2 a ton higher,
on all butt weld 8 in. and smaller.

Boiler Tubes
Seamless Steel and Lap Weld Commer-
cial Boiler Tubes and Locomotive Tubes.
Minimum Wall.

(Net base prices per 100 ft. f.o.b.
Pittsburgh in carload lots)

In.	Seamless	Lap
1	10.67	10.23
1 1/4	10.67	10.23
1 1/2	10.67	10.23
1 3/4	10.67	10.23
2	10.67	10.23
2 1/4	10.67	10.23
2 1/2	10.67	10.23
2 3/4	10.67	10.23
3	10.67	10.23
3 1/4	10.67	10.23
3 1/2	10.67	10.23
3 3/4	10.67	10.23
4	10.67	10.23
4 1/4	10.67	10.23
4 1/2	10.67	10.23
4 3/4	10.67	10.23
5	10.67	10.23
5 1/4	10.67	10.23
5 1/2	10.67	10.23
5 3/4	10.67	10.23
6	10.67	10.23

In.	Seamless	Lap
1	10.67	10.23
1 1/4	10.67	10.23
1 1/2	10.67	10.23
1 3/4	10.67	10.23
2	10.67	10.23
2 1/4	10.67	10.23
2 1/2	10.67	10.23
2 3/4	10.67	10.23
3	10.67	10.23
3 1/4	10.67	10.23
3 1/2	10.67	10.23
3 3/4	10.67	10.23
4	10.67	10.23
4 1/4	10.67	10.23
4 1/2	10.67	10.23
4 3/4	10.67	10.23
5	10.67	10.23
5 1/4	10.67	10.23
5 1/2	10.67	10.23
5 3/4	10.67	10.23
6	10.67	10.23

CAST IRON WATER PIPE
Per Net Ton

In.	Per Net Ton
*6-in. and larger, de'd	\$54.80
6-in. and larger, de'd	52.20
New York	46.00
*6-in. and larger, Bir-	56.00
mingham	
6-in. and larger, f.o.b.	
dock, San Francisco or	
Los Angeles or Seattle	

4-in. f.o.b. dock, San
Francisco or Los
Angeles 59.00
F.o.b. dock, Seattle .. 52.00

Class "A" and gas pipe, \$3
extra
4-in. pipe is \$3 a ton above
6-in.

Prices for lots of less than 200 tons.
For 200 tons and over, 6-in. and larger
is \$45. Birmingham, and \$53.80 deliv-
ered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland
Birmingham or Chicago)

Per Cent Off List
Machine and carriage bolts:
1/2 in. and 6 in. and
smaller 68 1/2

In.	Black Galv.
1	66
1 1/8 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3,	
and 7	68 1/2
Hot pressed nuts, and	
c.p.c. and t-nuts, square	
or hex. blank or tapped:	
1/2 in. and smaller	67
9/16 in. to 1 in. inclu-	
sive	64
1 1/8 in. to 1 1/2 in. incl.	62
1 1/2 in. and larger	60

On the above items with the excep-
tion of blow bolts, there is an addi-
tional allowance of 10 per cent for full
container quantities.

On all of the above items there is an
additional 5 per cent allowance for car-
load shipments.

In.	Black Galv.
1	66
1 1/8 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3,	
and 7	68 1/2
Hot pressed nuts, and	
c.p.c. and t-nuts, square	
or hex. blank or tapped:	
1/2 in. and smaller	67
9/16 in. to 1 in. inclu-	
sive	64
1 1/8 in. to 1 1/2 in. incl.	62
1 1/2 in. and larger	60

On stove bolts freight is allowed up
to 65c. per 100 lb. based on Cleveland,
Chicago or New York on lots of 200 lb.
or over.

Large Rivets
(1/2 in. and larger)
Base per 100 Lb.
F.o.b. Pittsburgh, Cleve-
land Chicago, Birming-
ham \$3.40

Small Rivets
(7/16 in. and smaller)
Per Cent Off List
F.o.b. Pittsburgh, Cleve-
land, Chicago, Birming-
ham 65 and 10

Cap and Set Screws
(Freight allowed up to 65c. per
100 lb. based on Cleveland,
Chicago or New York on lots
of 200 lb. or over.)

In.	Black Galv.
1	66
1 1/8 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3,	
and 7	68 1/2
Hot pressed nuts, and	
c.p.c. and t-nuts, square	
or hex. blank or tapped:	
1/2 in. and smaller	67
9/16 in. to 1 in. inclu-	
sive	64
1 1/8 in. to 1 1/2 in. incl.	62
1 1/2 in. and larger	60

Alloy Steel
Alloy Steel Blooms, Billets and
Slabs
F.o.b. Pittsburgh, Chicago,
Canton, Massillon, Buffalo,
Bethlehem.
Base price, \$56.00 a gross
ton.

Alloy Steel Bars
F.o.b. Pittsburgh, Chicago,
Buffalo, Bethlehem, Massillon
or Canton.
Open-hearth grade, base 2.70c.
Delivered, Detroit 2.80c.

S.A.E. Series	Alloy Differential per 100 Lb.
200 (1 1/4% Ni)	\$0.35
2100 (1 1/4% Ni)	0.75
2300 (3 1/4% Ni)	1.55
2500 (5% Ni)	2.25
31 Ni-Cr	0.70
3200 Ni-Cr	1.85
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
4340 Cr-Ni-Mo	1.65
4345 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.20 to 0.30 Mo 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr)	0.35
5100 Chrome steel (0.80-1.10 Cr)	0.45
6100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel
bars. The differential for most grades
in electric furnace steel is 50c. higher.
Slabs with a section area of 16 in. and
2 1/2 in. thick or over take the billet
base.

Alloy Cold-Finished Bars
F.o.b. Pittsburgh, Chicago,
Gary, Cleveland or Buffalo,
3.35c. base per lb. Delivered
Detroit, 3.45c., carlots.

PIG IRON AND FERROALLOYS

No. 2 Foundry	Price
F.o.b. Everett, Mass.	\$24.00
F.o.b. Bethlehem, Birds-	
boro and Swedeland,	
Pa. and Sparrows	
Point, Md.	24.00
Delivered Brooklyn	26.50
Delivered New York or	
Jersey City	25.53
Delivered Philadelphia	24.84
F.o.b. Neville Island,	
Erie, Pa., Toledo, Chi-	
cago, Granite City,	
Cleveland and Youngs-	
town	23.00
F.o.b. Buffalo	23.00
F.o.b. Detroit	23.00
Southern, de'd, Cincin-	
nati	23.06
Northern, de'd, Cincin-	
nati	23.44
F.o.b. Duluth	23.50
F.o.b. Provo, Utah	21.00
Delivered, San Francis-	
co, Los Angeles or	
Seattle	26.50
F.o.b. Birmingham*	19.38

* Delivered prices on Southern iron
for shipment to Northern points are 38c.
a ton below delivered prices from nearest
Northern basing point on iron with phos-
phorus content of 0.70 per cent and over.

Malleable
Base prices on malleable
iron are 50c. a ton above No.
2 foundry quotations at Ever-
ett, Eastern Pennsylvania
furnaces, Erie and Buffalo.
Elsewhere they are the same,
except at Birmingham and
Provo, which are not mallea-
ble iron basing points.

Basic	Price
F.o.b. Everett, Mass.	\$23.50
F.o.b. Bethlehem, Birds-	
boro, Swedeland and	
Steelton, Pa., and	
Sparrows Point, Md.	23.50
F.o.b. Buffalo	22.00
F.o.b. Neville Island,	
Erie, Pa., Toledo, Chi-	
cago, Granite City,	
Cleveland and Youngs-	
town	22.50
Delivered Philadelphia	24.34
Delivered Canton, Ohio	23.89
Delivered Mansfield,	
Ohio	24.44
F.o.b. Birmingham	18.00

Bessemer
F.o.b. Buffalo \$24.00
F.o.b. Everett, Mass.... 25.00
F.o.b. Bethlehem, Birds-
boro and Swedeland,
Pa. 25.00

STAINLESS & HEAT RESISTANT ALLOYS

(Base prices, cents per lb.
f.o.b. Pittsburgh)

Chrome-Nickel	No. 304 No. 302
Forging billets	21.25c. 20.40c.
Bars	25c. 24c.
Plates	29c. 27c.
Structural shapes	25c. 24c.
Sheets	36c. 34c.
Hot-rolled strip	23.50c. 21.50c.
Cold-rolled strip	30c. 28c.
Drawn wire	25c. 24c.

Straight Chrome	No. 410 No. 430 No. 442 No. 446
Bars	18.50c. 19c. 22.50c. 27.50c.
Plates	21.50c. 22c. 25.50c. 30.50c.
Sheets	26.50c. 29c. 32.50c. 36.50c.
Hot strip	17c. 17.50c. 24c. 35c.
Cold strip	22c. 22.50c. 32c. 52c.

TOOL STEEL	Price
High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to
all points on or East of Mississippi
River are 2c. a lb. higher. West of
Mississippi quotations are 3c. a lb.
higher.

Low Phosphorus
Basing points: Birds-
boro, Pa., Steelton, Pa.,
and Buffalo \$28.50

Gray Forge
Valley or Pittsburgh fur-
nace \$22.50

Charcoal
Lake Superior furnace \$27.00
Delivered Chicago 30.34

Canadian Pig Iron
Per Gross Ton

Montreal	Price
Foundry iron	\$27.50 base
Malleable	28.00 base
Basic	27.50 base

Toronto
Foundry iron \$25.50 base
Malleable 26.00 base
Basic 25.50 base

On all grades 2.25 per cent silicon
and under is base. For each 25 points
of silicon over 2.25 per cent an extra
of 25c. is charged.

Ferromanganese
F.o.b. New York, Philadel-
phia, Baltimore, Mobile or
New Orleans.

Per Gross Ton
Domestic, 80% (car-
load) \$100.00

Spiegeleisen
Per Gross Ton Furnace

Domestic	Price
Domestic, 19 to 21%	\$32.00
Domestic, 26 to 28%	39.50

Electric Ferrosilicon
Per Gross Ton Delivered;
Lump Size

50%	Price
50% (carload lots, bulk)	\$69.50*
50% (ton lots, packed)	82.00*
75% (carload lots, bulk)	126.00*
75% (ton lots, packed)	142.00*

Bessemer Ferrosilicon
F.o.b. Furnace, Jackson, Ohio

Per Gross Ton
10.00 to 10.50% \$32.50
For each additional 0.50% silicon up
to 12%. 50c. per ton is added. Above
12% add 75c. per ton.

For each unit of manganese over 2%, \$1 per ton additional.
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton
F.o.b. Jackson, Ohio, 5.00

To 5.50%\$27.50
For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon11.00c.
2% carbon17.50c.
1% carbon18.50c.
0.10% carbon20.50c.
0.06% carbon21.00c.
Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon\$98.00*
2.50% carbon103.00*
2% carbon108.00*
1% carbon118.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carload\$2.00

Ferrotungsten, 100 lb. and less 2.25

Ferrovanadium, contract, per lb. contained V., del'd \$2.70 to \$2.90†

Ferracolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots \$2.25†

Ferrocobalt, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton\$142.50

Ferrocobalt, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton\$157.50

Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton\$58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville\$75.00

Ferromolybdenum, per lb. Mo f.o.b. furnace 95c.
Calcium molybdate, per lb. Mo f.o.b. furnace 80c.
Molybdenum oxide briquettes 48-52% Mo per lb. contained Mo f.o.b. Langeloth, Pa. 80c.

*Spot prices are \$5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

*ORES

Lake Superior Ores

Delivered Lower Lake Ports Per Gross Ton

Old range, bessemer, 51.50%\$5.25

Old range, non-bessemer, 51.50% 5.10

Mesaba, bessemer, 51.50% 5.10

Mesaba, non-bessemer, 51.50% 4.95

High phosphorus, 51.50% 4.85

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty Per Unit

Algerian, low P, Cu free, dry, 55 to 58% Fe 14c.

Swedish, low P, 68% Fe. 14c.

Swedish, basic or foundry, 65% Fe 11c.

Caucasian, washed, 52% Mn 50c.

African, Indian, 44 to 48% Mn 46c.

African, Indian, 49 to 51% Mn 49c.

Brazilian, 46 to 48% Mn. 47c.

Cuban, del'd, duty free, 51% Mn 62c.

Tungsten, Chinese, Wolframite, duty paid, delivered\$23.00 to \$23.50

Tungsten, domestic scheelite del'd 23.00 to 23.50

Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)\$19.00

Rhodesian, 45% 22.00

Rhodesian, 48% 26.00 to 27.00

Turkish, 48-49% 29.00 to 30.00

Turkish, 45-46% ...Nominal

Turkish, 40-41% ...Nominal

Chrome concentrates c.i.f. Atlantic Seaboard, per gross ton: Turkish, 48-49% ...Nominal

*All foreign ore prices are nominal.

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail\$21.00

Domestic, f.o.b. Ohio River landing barges... 21.00

No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines\$20.00 to 22.00

Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid\$25.00 to \$25.50

Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines\$31.00

ditto, in bags, f.o.b., same mines\$32.60

FUEL OIL

Per Gal.

No. 3, f.o.b. Bayonne, N. J. 5.10c.

No. 6, f.o.b. Bayonne, N. J. 3.57c.

No. 5 Bur. Stds. del'd Chicago 3.25c.

No. 6 Bur. Stds. del'd Chicago 2.75c.

No. 3 distillate, del'd Cleveland 5.25c.

No. 4 industrial, del'd Cleveland 5.00c.

No. 5 industrial, del'd Cleveland 4.25c.

No. 6 industrial, del'd Cleveland 3.875c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt\$4.00 to \$4.25

Foundry, f.o.b. Connellsville, Prompt\$5.25 to \$5.50

Foundry, by-product Chicago ovens\$10.50

Foundry, by-product delivered New England\$12.50

Foundry, by-product delivered Newark or Jersey City,\$11.38 to \$11.90

Foundry, by-product Philadelphia\$11.13

Foundry, by-product delivered Cleveland\$11.05

Foundry, by-product delivered Cincinnati\$10.50

Foundry, Birmingham,\$7.50

Foundry, by-product delivered St. Louis industrial district\$10.75 to \$11.00

Foundry, from Birmingham, f.o.b. cars dock Pacific ports\$14.75

REFRACTORIES PRICES

Fire Clay Brick

Per 1000 f.o.b. Works

Super-duty brick, at St. Louis\$60.80

First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois 47.50

First quality, New Jersey 52.50

Second quality, Pennsylvania, Maryland, Ken-

tucky, Missouri and Illinois 42.75

Second quality, New Jersey 49.00

No. 1 Ohio 39.90

Ground fire clay, per ton (Eastern) 8.55

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania\$47.50

Chicago District 55.10

Birmingham 47.50

Silica cement per net ton (Eastern) 8.55

Chrome Brick

Net per Ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester\$50.00

Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. 50.00

Magnesite Brick

Net per Ton

Standard f.o.b. Baltimore and Chester\$72.00

Chemically bonded, f.o.b. Baltimore 61.00

Grain Magnesite

Net per Ton

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks) (—)*

Domestic, f.o.b. Baltimore and Chester in sacks... 40.00

Domestic, f.o.b. Chewah, Wash. (in bulk) .. 22.00

* None available.

British and Continental BRITISH

Per Gross Ton

f.o.b. United Kingdom Ports

Ferromanganese, export£17 18s.

Tin plate, per base box32s. to 33s.

Steel bars, open hearth13£ 9s.

Beams, open hearth 12£ 2s. 6d.

Channels, open hearth 12£ 2s. 6d.

Angles, open hearth 12£ 2s. 6d.

Black sheets, No. 24 gage 17£ max.*; 17£ min.**

Galvanized sheets, No. 24 gage 19£ 10s. max.*; 19£ 10s. min.**

* Empire markets only.

** Other than Empire markets.

CONTINENTAL

Per Gross Ton, Belgian France f.o.b. Continental Ports

Bars, merchant1500

Plates1750

Joists1475

Sheets, thin1900

Above prices are minimum base to which 100 francs should be added to cover war risk insurance, freight charges, etc.

WAREHOUSE PRICES

Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	St. Louis	St. Paul	Milwaukee
Sheets, hot rolled	\$3.35	\$3.35	\$3.35	\$3.55	\$3.58	\$3.43	\$3.35	\$3.71	\$3.38	\$3.60	\$3.48
Sheets, cold rolled	4.75	4.30	4.05	4.55	4.60	4.50	4.55	4.78	4.32	4.95	4.43
Sheets, galv.	3.60	3.60	3.50	3.85	3.96	3.68	3.82	4.06	3.72	4.95	4.98
Strip, hot rolled	3.20	3.50	3.20	3.51	3.51	3.40	3.42	3.46	3.61	3.83	3.54
Strip, cold rolled	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.47	3.80	3.68
Plates	3.40	3.55	3.40	3.55	3.75	3.65	3.40	3.85	3.47	3.80	3.68
Structural shapes	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.62	3.75	3.63
Bars, hot rolled	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.02	4.34	3.88
Bars, cold finished	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.10	7.47	7.45	7.33
Bars, hot rolled SAE 2300	5.75	5.65	5.85	5.86	5.90	5.97	5.65	5.65	6.02	6.00	5.88
Bars, hot rolled SAE 3100	8.15	8.15	8.15	8.56	8.59	8.85	8.15	8.63	8.52	8.84	8.38
Bars, cold drawn SAE 2300	6.75	6.75	6.75	7.16	7.19	7.45	6.75	7.23	7.12	7.44	6.98
Bars, cold drawn SAE 3100											

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, less than 1500 lb.; cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb.; galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb.; galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb.; galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., galvanized sheets, any quantity, cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb. Extras for size, quality, etc., apply on above quotations.

Supreme Court Upholds NLRB Order Against Republic Steel

WASHINGTON—The United States Supreme Court on Monday in effect approved a National Labor Relations Board order requiring Republic Steel Corp. to rehire with back pay SWOC employees who participated in the "little steel" strike of 1937. The high court let stand the board order by refusing to grant a petition filed by Republic for a review of a decision by the Third Circuit Court of Appeals at Philadelphia in November, 1939, upholding the board order which was issued on Oct. 18, 1938.

It was estimated at the time that the order affected 5000 employees, involving \$3,000,000 in back pay. However, many of the employees were rehired

SWOC Seeks 30-hr. Week For Steel Industry

MILWAUKEE—The Wisconsin-Northern Illinois district convention of the SWOC adopted a resolution last week seeking a 30-hr. work week in the steel industry to reduce unemployment.

and it is reported here that back pay will aggregate between \$1,000,000 and \$2,000,000.

The order does not require reinstatement of some 75 or 100 strikers who were convicted upon a plea of guilty of the "malicious destruction of property to the value of \$300 and those who were convicted of possession of a bomb." It does, however, include, as ordered by the board, others who were alleged to have committed illegal acts at Republic plants in Ohio. Justice Roberts did not participate in the Supreme Court's refusal to review the lower court decision.

Suit Filed By Republic

In May, 1939, SWOC filed claims with Labor Board Regional Director H. L. Lodish at Cleveland for back pay for 6200 strikers and estimated that the total amount involved was around \$7,500,000. The Republic had just filed suit in the United States Circuit Court at Cleveland against the CIO, SWOC and their officers for \$7,500,000. The suit was filed under the Sherman and Clayton acts. The amount asked was treble the \$2,500,-

000 which the company set as the minimum damages directly sustained as a result of SWOC strike activities.

The Circuit Court of Appeals upheld almost every point of the Labor Board order which held the company to be guilty of unfair labor practices and responsible for the strike. The court said the strike could not be classified as a sit-down strike and therefore did not fall under the Supreme Court ruling that sit-down strikers are liable to loss of their jobs.

In addition to refusing to review the lower court's decision the Supreme Court declined to grant a review of an appeal of the Central Council of Employee Representatives, one of the independent organizations which the board ordered disestablished in the Republic case. The council, in separate court proceedings, had unsuccessfully attacked the board's order disestablishing it.

Hiring Problem Not Serious, Republic States

CLEVELAND—Republic Steel Corp. issued the following statement, commenting on the Supreme Court's refusal to review the decision of the Third Circuit Court of Appeals sustaining the order issued against the company by the Labor Board on Oct. 18, 1938:

"The company has always advocated the general principle of reinstatement of men who went out on strike, as was clearly stated in public announcements during the course of the strike in the summer of 1937.

"We have always said that the company would reinstate all men who had been on strike and who were not guilty of violence or illegal acts. Reinstatement started immediately after the strike and has been continuing ever since.

"The greater number of the employees to be reinstated under the order have long since been returned to work, and compliance with the board's order will not involve any serious reemployment problem."

PITTSBURGH—Philip Murray, chairman of the Steel Workers Organizing Committee, said:

"The Supreme Court decision is a complete victory and a confirmation of the position taken by the SWOC three years ago and in addition destroys Re-

public's case against the SWOC in its contention that the strike was a conspiracy for the purpose of interfering with the business of the corporation."

Reduction in Tin Can Sizes Urged By Standards Bureau

WASHINGTON—A tin can simplification program aimed at preventing consumer deception will be the subject of a public hearing to be held within the next three weeks by the House Committee on Coinage Weights and Measures. Although no definite date has been fixed, word that the session would be called came after it was learned that the Bureau of Standards is circularizing interested parties on a revision of simplified practice recommendations covering cans proposed last July.

Representing a reduction of six in the number of sizes previously proposed, the revised list includes some substitutions and deletions as well as additions. There are 38 sizes proposed.

British License Scrap Purchases

LONDON—Leslie Burgin, British Minister of Supply, has issued an order which marks an important change in the method of control of scrap iron and steel. Hitherto it has not been necessary for purchasers to obtain licenses to acquire iron and steel scrap save for four special grades, but as from April 1, any person desiring to acquire scrap iron or steel must be authorized by license to do so, except in the case of a person (other than one operating an iron or steel mill or foundry or forge) who confines his acquisitions to quantities not exceeding in the aggregate one ton from any one person in any one week. This exception leaves municipal authorities and voluntary organizations free to continue house to house and other collections of scrap.

Navy Gives Orders For Bridge Cranes

WASHINGTON—The Navy Department has awarded a \$175,400 contract for two 175-ton bridge cranes and four three-ton wall cranes for the New York Navy Yard to the Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. It also has awarded a \$41,960 contract for two 20-ton bridge cranes for the New York Navy Yard to the Harnischfeger Corp., Milwaukee.

THIS WEEK'S MACHINE ... TOOL ACTIVITIES ...

... March was a satisfactory month in many centers and April is off to a good start ... Considerable buying attributed to machine tool industry itself or indirectly through the letting out of work, which is on the increase ... Improvement in deliveries seen in special lines like lathes, but many machines are quoted for delivery into 1941.

CINCINNATI — Machinery demand in this area leveled out during the past week. Foreign demand in the lighter types of machinery still tends to be aggressive and overbalances domestic demand, while in the heavier types and in drilling machinery there seems to be a better parity of foreign and domestic business. British and French purchases continue to be most noticeable in export business. A feeling that domestic demand will tend to increase during the ensuing months brought about some rearrangement in a few plants locally to take care of this anticipated improvement in home purchasing. Delivery on some standard types of tools is reported to be about 12 weeks, but the general rate is much longer. In many types manufacturers report that they are unable to make deliveries before the end of this year and, in an increasing number of instances, not until 1941.

Production is relatively unchanged with all plants operating at capacity, on the basis of the present skilled labor supply.

CLEVELAND — April is off to a promising start for local dealers. Prospects are numerically good, although individual propositions consist of single machines for the most part. Considerable business is arising from the machine tool industry itself due to the letting out of work. A manufacturer of special machinery who has undertaken production of small vertical millers has been in the market. Production for a Detroit machine tool maker is reported under way here, while a Cleveland company has let out a group of thread grinders to an outside plant. In another district manufacture of several hundred millers has been undertaken by a plant hitherto not in machine tool production directly. Such shifting of production usually involves some new equipment.

The largest local order placed here recently was for around 20 machines, including a gear grinder, millers and planers, for a machine tool manufacturer's expansion.

Recent purchases also include equipment for the auto parts industry, and for aircraft parts makers. The latter continue operating at a peak. Machine tool deliveries to the aircraft field have been expedited.

Chicago Dealers Concerned Over Illinois Sales Tax

CHICAGO — Chicago machine tool sellers are still seriously concerned over the revision in the State sales tax which

makes its provisions applicable to machine tools sold at retail in Illinois even though shipment is direct to the buyer from an out-of-state point. Several agencies, including the Illinois Manufacturers' Association and the Machinery and Allied Products Institute, have issued legal opinions on this matter but as of today practically all sellers are adding 3 1/10 per cent to their selling price to cover the additional expense imposed upon them by this tax. It is probable that this procedure will be followed until such time as a review case has passed through the courts or machinery is judged to be exempt from the tax as is now the case in some other states.

March was a good month for machinery sales offices in Chicago, the volume of business reported being double and triple that of February in some cases. Small tool sales were up about 20 per cent. Inquiries have improved in the last week or so. The 1940 appropriation for the Rock Island Arsenal has still not been approved but it is heard that the amount requested is being reduced considerably in Washington. The Milwaukee Road has ordered a few of the machines on its list, but a number of the larger units are still pending.

Olds Buying Equipment For Hydramatic Transmission

DETROIT — Recent automotive purchases of machinery have centered somewhat on the Olds transmission being built in Detroit. Within the last 10 days equipment has been purchased for the somewhat larger version of the hydramatic transmission which has many parts interchangeable with the current model. It is also known definitely that Buick is seriously considering the possibility of using this type of transmission next year. This would double or triple potential demand and would require considerable buying of new machinery, although shifting of equipment from the Buick transmission department at Flint is contemplated.

Welding machine manufacturers report the current season is one of the heaviest with sales running 20 to 30 per cent above those of a year ago.

Machine Tool Builders Active Buyers in the East

NEW YORK — The machine tool industry itself, particularly in the New England area, is one of the most active buyers of machine tools at present. Among buyers of production machinery

they led as a group last week because most of the plants are expanding their capacity. This trend is an indirect reflection of war activity, but otherwise there was a well diversified volume of business placed, coming from general industrial sources. Even without the large expected aircraft orders, April business started out in better shape than did March.

Deliveries on some items, like gear hobbors, are being quoted into March, 1941, but in some lines there has been a betterment of the delivery situation in recent weeks. Through concentrating on the production of fewer lines and increasing efficiency of output, one lathe manufacturer, for example, has been able to cut lathe deliveries on popular sizes from 20 to 10 weeks. For the bulk of equipment, however, six months represents the average.

Foreign buying of machine tools has slowed up in recent weeks. Machine tool buyers for both the French and the British are abroad at present and when they return to New York a change in buying policy is looked for. It is expected in some quarters that the British will place more orders through the British Purchasing Commission in New York instead of the bulk of orders coming through agents of American firms in England as was the case in the early stages of the war effort.

23 Labor Disputes Settled By Toledo Board in '39

TOLEDO — Twenty-three labor disputes involving 3509 employees were settled by the Toledo Industrial Peace board in 1939. Ten of the disputes were active strikes which got under way before peace board action could be taken. Of the total disputes, 15 were of major importance and eight were of minor character. Ten disputes involving national or jurisdictional factors were settled by other agencies.

Issues show a change from early years' operation of the board. Chief issues in the 1939 disputes were demands for wage increases, vacations with pay, alleged unjustified discharges and unsettled grievances, interruption of agreements, picketing for various reasons, and in only one case was recognition of a union involved.

In the four and one-half years that the board has been functioning it has participated in the settlement of 157 disputes, preventing strikes, in which 31,053 employees have been involved.

"Metal Statistics" Issued

THE American Metal Market, 111 John Street, New York, announces the publication of the 1940 edition of "Metal Statistics," which has been issued annually for the past 33 years. The book is published in the usual 6 x 4-in. size and sells for \$2 a copy.

Travel: 11"
Speed: 150 SFM
Feed: 5/64"
Size Tool: 1/2" Sq.
Diameter: 15"

☆ ☆

MAKERS OF HIGH SPEED, TOOL, STAINLESS, ALLOY,
PRODUCTION AND SPECIAL PURPOSE STEELS

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

American Locomotive Co., 30 Church Street, New York, will proceed at once with one-story addition, 109 x 300 ft., at Schenectady, N. Y., plant for expansion in diesel locomotive shops. Separate contracts are being let for foundations, superstructure, etc. Cost over \$85,000 with equipment, instead of smaller sum previously noted.

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until April 16 for one portable floor sander (Circular 565); until April 18 for forgings (Circular 552); until April 19, for gages (Circular 561).

Canada Dry Ginger Ale, Inc., 100 East Forty-second Street, New York, has let general contract to Hiram Elliott Construction Co., 1016 Baltimore Street, Kansas City, Mo., for one-story branch plant, 160 x 240 ft., North Kansas City, Mo., for mechanical bottling, storage and distribution. Cost over \$125,000 with equipment. Walter M. Cory, 30 Church Street, New York, is architect and engineer.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until April 15 for 16,000 ft. of cable and 10 reels (Circular 362), 100 manhole tops (Circular 369); until April 22 for power units (Circulars 348 and 349).

Standard Oil Development Co., 26 Broadway, New York, plans new works at Baton Rouge, La., for production of synthetic rubber. Standard Oil Co. of Louisiana, Baton Rouge, an affiliated organization, is interested in project and its local oil refinery will be used to furnish required raw material (butadiene), made from petroleum gases. Cost over \$200,000 with equipment.

City Council, Plattsburgh, N. Y., asks bids until April 17 for erection of municipal power plant, including electrical work, heating, ventilating, etc. (Contracts 2 to 5), and for an electrical distribution system (Contract 6). Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 16 for two motor-driven, ram-type turret lathes (Schedule 1227), 1000 welder's helmets without lenses, 120,000 helmet or hand-shield lenses, and 600 welder's shields (Schedule 1216); coal-burning boiler, with grates, soot blowers, valves, fittings, etc. (Schedule 1232) for Brooklyn Navy Yard; until April 19, one 10 cu. ft. concrete mixer (Schedule 1250) for Brooklyn yard; 100 constant speed control units and engine parts (Schedule 900-3264) for Philadelphia Navy Yard.

Quartermaster, West Point, N. Y., asks bids until April 16 for a magazine feed boiler (Circular 1052-116).

Nuodex Products, Inc., 312 Division Street, Elizabeth, N. J., driers for varnishes, lacquers, etc., has let general contract to Bonanno Construction Co., 1827 Bergen Turnpike, North Bergen, N. J., for one-story plant, 140 x 155 ft., near present works. Cost about \$130,000 with equipment. James J. Rothstein, 220 Hutton Street, Jersey City, N. J., is architect.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until April 15 for 10 pneumatic staking machines, capacity 6000 lb., operating at 80-lb. air pressure (Circular 1336), two spinning machines, operating at 900 to 5000 r.p.m., for arming test of fuze elements (Circular 1337); until April 16 for gages, single and plug, snap, twin ring, flush pin, length, etc. (Circular 337).

Wilson-Martin Division of Wilson & Co., Swanson Street and Snyder Avenue, Philadelphia, refined oils, has asked bids on general contract for one-story addition and im-

provements in present plant; also for extensions and improvements in boiler house. Cost over \$50,000 with equipment.

Quartermaster Depot, Twenty-first and Johnston Streets, Philadelphia, asks bids until April 16 for 45 two-wheel hand trucks, 95 warehouse trailers, and two gasoline tractors (Circular 669-297).

◀ BUFFALO DISTRICT ▶

Markel Electric Products, Inc., 145 Seneca Street, Buffalo, electric specialties, has let general contract to Boehm Brothers, Inc., 245 Colorado Avenue, for one-story addition. Cost close to \$45,000 with equipment. Joseph J. Geigand, 234 Crescent Avenue, is architect.

Coca-Cola Bottling Co., Auburn, N. Y., has let general contract to Dawson Brothers Construction Co., Inc., Union Building, Syracuse, N. Y., for one-story mechanical-bottling, storage and distributing plant. Cost close to \$45,000 with equipment. Melvin L. and Harry A. King, Denison Building, Syracuse, are architects.

Parks Department, Municipal airport, Genesee and Cayuga Roads, Buffalo, plans steel hangar, with repair and service facilities, at municipal airport. Cost close to \$100,000 with equipment.

Jamestown Metal Equipment Co., Inc., Jamestown, N. Y., maker of automobile radiators, and office, bank, hospital and library equipment, is completing a one-story addition, 80 x 240 ft. A further one-story addition, 240 x 700 ft., is in contemplation but will not be built for at least a year, the company states, and not this spring, as mentioned in the March 28 issue.

◀ WASHINGTON DIST. ▶

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until April 29 for 4535 galvanized steel drums, each 10-gal., for inflammable liquid, and 4000 flexible nozzle tubes for refilling gasoline drums (Circular 298-182).

Virginia Electric & Power Co., Richmond, Va., has filed plans for modernization in steam-electric generating plant on Reeves Street, Norfolk, Va., to cost about \$300,000, larger part of expenditure for smoke elimination equipment and facilities. Stone & Webster Engineering Corp., 49 Federal Street, Boston, is consulting engineer.

General Purchasing Officer, Panama Canal, Washington, asks bids until April 15 for two motor-driven, ball-bearing bench grinders, two shearing units, automobile jacks, spring nests, polished brass searchlights, etc. (Schedule 3990); until April 18, 105 cu. ft. gasoline engine-driven portable air compressor, two-wheel trailer type, with pneumatic tires (Schedule 3997); until April 19, 10 1-hp. electric motors, copper wire, magnet wire, connecting blocks, forged monel metal or bronze hooks, switchboard fittings, terminals, etc. (Schedule 3996).

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until April 15 for four 500-lb. electric hoists, plug-in type (Circular 619); until April 25, 100.275 aluminum base angle tubes, and 102,500 aluminum base elbow nozzles (Circular 600).

American Oil Co., American Building, Baltimore, plans one-story building for bulk oil storage and distribution at Curtis Bay. Cost close to \$40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 16 for one metal shaper (Schedule 1241); until April 19, 12-in. screw-cutting precision lathe, geared-head (Schedule 1193) for Quantico, Va., station; two metal shearing machines, with accessories, wrenches, gages, etc. (Schedule 1197) for Quantico and San Diego yards, all motor-driven; electric fuses (Schedule 1220), electric drive truck, tilting, tiering, telescopic fork type, with forward tilt unit (Schedule 1199), similar electric drive truck, with battery (Schedule 1200), motor-driven metal punch and shear, single end (Schedule 1185) for Eastern and Western Navy yards.

◀ NEW ENGLAND ▶

Russell Mfg. Co., Middletown, Conn., brake lining and kindred products, has let general contract to Denis O'Brien & Sons, Inc., Middletown, for two-story addition, 140 x 144 ft., to replace structure recently destroyed by fire. Cost close to \$300,000 with equipment.

Quartermaster, Fort Ethan Allen, Vt., asks bids until April 15 for one hydraulic lift (Circular 107-23).

Universal Overland Express, Inc., 27 Tudor Street, Cambridge, Mass., plans two-story machine shop, 60 x 180 ft., on McGrath Highway, for motor trucks and equipment. Cost close to \$50,000 with machinery. Henry F. Bryant & Son, 46 White Place, Brookline, Mass., are architects and engineers.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until April 15 for steel and alloy steel screws and plungers for firearms service, including socket head cap screws, set screws, etc. (Circular 343), gages, including adjustable snap, check, depth, plug, etc. (Circular 344).

New Haven Pulp & Board Co., 259 East Street, New Haven, Conn., has let general contract to Dwight Building Co., 67 Church Street, for one-story addition, 33 x 155 ft., for storage and distribution, also improvements in present plant building. Cost close to \$40,000.

◀ SOUTH ATLANTIC ▶

Brunswick Pulp & Paper Co., Brunswick, Ga., has approved plans for expansion and improvements, including additional equipment to increase capacity about 25 per cent. Cost about \$250,000 with machinery. Company is a joint interest of Mead Corp., Chillicothe, Ohio, and Scott Paper Co., Chester, Pa.

Public Works Officer, Navy Yard, Charleston, S. C., asks bids until April 16 for one and two-story addition to machine shop, 13 x 165 ft., and 25 x 290 ft. respectively, also improvements in present structure (Specifications 9709).

Standard Mill Supply Co., Pawtucket, R. I., textile mill equipment and supplies, has leased one-story building at 502-14 West Fourth Street, Charlotte, N. C., for factory branch, storage and distributing plant.

◀ WESTERN PA. DIST. ▶

Sun Oil Co., 1608 Walnut Street, Philadelphia, has plans for new bulk oil plant at Lake and Wallbridge Roads, Erie, Pa., including one-story building, with steel tanks, pumping unit and auxiliary equipment. Cost close to \$65,000. District office, Grant Building, Pittsburgh, will be in charge.

City Controller, City-County Building, Pittsburgh, asks bids until April 15 for addition to power plant at Leech Farm Sanitarium, and improvements in present station, including equipment. Cost about \$170,000. Marks & Simbol, 541 Wood Street, are architects.

◀ SOUTH CENTRAL ▶

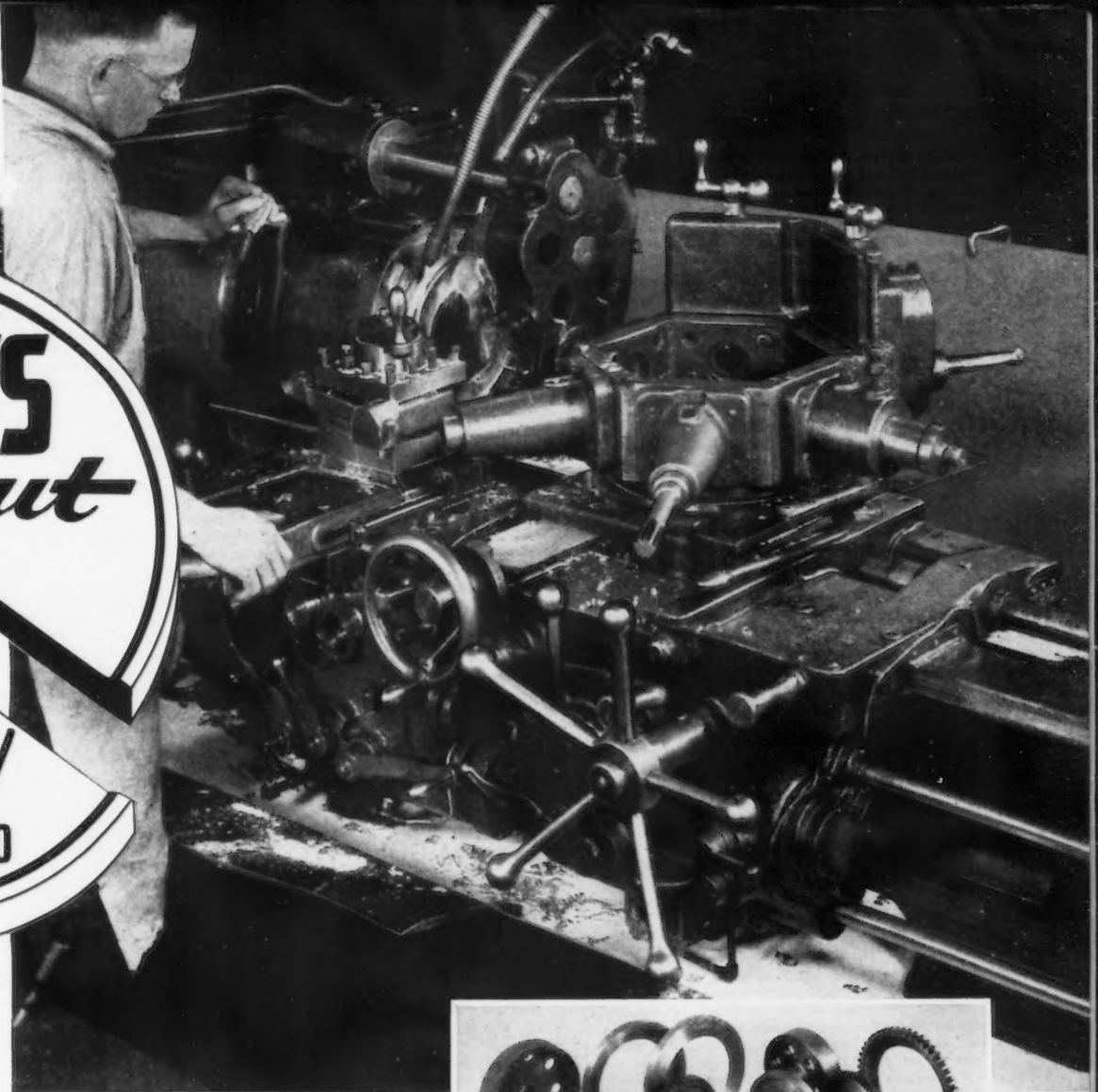
Kentucky Macaroni Co., 2521 South Floyd Street, Louisville, food products, will award general contract soon for five-story and basement addition, 100 x 145 ft. Cost close to \$150,000 with machinery, conveyors and other equipment. D. X. Murphy & Brother, Louisville Trust Building, are architects.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until April 17 for mechanical fans, motors, drives and accessory equipment for heating and ventilating systems for generating units Nos. 3 and 4, Wheeler hydroelectric power plant; until April 26, hydraulic turbine with governor, for unit No. 3, Pickwick dam hydroelectric power plant; and electric generator unit for turbine noted.

Celotex Corp., Marrero, near New Orleans, insulating board, wall board and kindred products, has let general contract to W. Horace

COSTS
were cut

30%



ON THESE MISCELLANEOUS PARTS The New Gisholts Are Doing It Every Day

● Perhaps you regard some of your costs as "standardized"—perhaps further economies are not apparent. This manufacturer thought so—until he installed this new Gisholt 1L High-Production Turret Lathe. Parts come to the machine in small quantities of only 25 and 50 at a time. Yet its faster, easier operation made it possible to cut the average machining costs 30% on 19 different items.

Probably there are similar savings to be made in your plant. Would you like to have a Gisholt engineer show you how they are possible?



★ On work such as shown above, the ability to take multiple cuts, the rapid traverse on the cross slide and the cross-feeding hexagon turret are important time-saving features of the Gisholt machine. Furthermore, the operator finds it easy to feed to exact dimensions with the large micrometer dials and automatic stops provided on this machine.

• • •

Gisholt High-Production Turret Lathes are described in this new Bulletin. May we send you copy?



"YOUR SMARTEST INVESTMENT TODAY—BETTER MACHINE TOOLS"



GISHOLT

MACHINE COMPANY

1215 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.
TURRET LATHES • AUTOMATIC LATHES • TOOL GRINDERS • BALANCING MACHINES

Williams Co., Southern Building, New Orleans, for one-story addition, 196 x 200 ft., for storage and distribution. Cost over \$60,000 with equipment. Main offices are at 919 North Michigan Avenue, Chicago.

City Council, Meridian, Miss., plans new steel hangar, with repair and reconditioning facilities, and administration building at Key Field, municipal airport. Cost about \$115,000 with equipment. Krouse & Brasfield, Meridian, are architects.

◀ SOUTHWEST ▶

Atchison, Topeka & Santa Fe Railway Co., Topeka, Kan., has asked bids on general contract for one-story addition, 20 x 320 ft., at local car and locomotive shops, for expansion in steel coach department. Cost over \$65,000 with equipment. H. W. Wagner is chief engineer.

Monocoupe Corp., Lambert-St. Louis municipal airport, St. Louis, airplanes and parts, has arranged with city officials at Orlando, Fla., for erection of one-story building, to be occupied under long-term lease, for new plant, including parts production and assembling. Present works will be removed to new location and capacity increased. Cost about \$150,000 with equipment. Property now occupied by Monocoupe Corp. was purchased recently by McDonnell Aircraft Corp., Lambert-St. Louis municipal airport, for production of military planes.

United States Engineer Office, Court and Custom House, St. Louis, asks bids until April 17 for one-story standardized steel building, 48 x 166 ft., at local United States Engineer boatyard.

Board of Public Utilities, Kansas City, Kan., Charles A. Lowder, secretary, plans extensions and improvements in municipal pumping plant on Strong Avenue, including new pumping machinery and auxiliary equipment. Cost about \$35,000.

Interstate Oil Refining Co., Sherman, Tex., plans one-story building, 150 x 250 ft., for bulk oil storage and distribution, with tanks, pumping unit and other facilities. One-story service and garage building, 40 x 163 ft., will be built on adjoining site for motor trucks. Cost about \$85,000 with equipment.

Graugnard's Baking Co., Thirteenth and I. Streets, Galveston, Tex., plans one-story addition and modernization and improvements in present plant. Cost over \$45,000 with traveling ovens, conveyors and other equipment. William J. Kettle, Galveston, is architect.

◀ OHIO AND INDIANA ▶

Shellmar Products Co., Mount Vernon, Ohio, cellophane products, plans one-story addition to converting plant, 100 x 225 ft. Cost close to \$80,000 with machinery. Main offices are at 224 South Michigan Avenue, Chicago.

William Powell Co., 2325 Spring Grove Avenue, Cincinnati, valves and other engineering specialties, has let general contract to Ferro Concrete Construction Co., Third and Elm Streets, for two-story top addition to present three-story plant, 70 x 120 ft. Cost close to \$70,000 with equipment. Tietig & Lee, 34 West Sixth Street, are architects.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until April 17 for connector bodies, plug attachment bodies, plug caps, lamp wire guards, electric hot plates, sockets, etc. (Circular 1290), stabilizing mechanism (Circular 1300); until April 18, centering machine, two lathes, metal-spinning lathe, screw machine, all-motor-driven (Circular 1305), three flow meters, one manometer and one high-pressure pump (Circular 1308), seven fuel meter indicator testers (Circular 1307), drift-meter test fixture assembly, drift-meter test fixture stand assembly, 14 drift-meter test fixture base plugs, etc. (Circular 1312); until April 19, two buffers and polishers, two grinders and buffers, bench grinder, two carbide tool grinders, drill grinder, 14 flexible shaft grinders, two pedestal-type grinders, all motor-driven (Circular 1315).

Indiana Farms Canning Corp., W. B. Hauger, president, Indianapolis, care of Vernon C. Bower, 1709 Madison Avenue, engineer,

plans new one and two-story food products canning plant, 248 x 300 ft., near city, including boiler house and other auxiliary buildings. Cost close to \$100,000 with equipment.

Federal Machine & Welder Co., Warren, Ohio, has recently let contract for new engineering building, with about 8000 sq. ft. of floor space. Part of building will be used for engineering offices and remainder for research and metallurgical laboratories. Completion is scheduled for May 15.

◀ MICHIGAN DISTRICT ▶

Schmidt Brewing Co., 1995 Wilkins Street, Detroit, will begin work soon on two additions, one and two stories, for expansion in mechanical-bottling department and stock house respectively, increasing capacity in both cases about 50 per cent. Cost close to \$320,000 with equipment. Harley & Ellington, Stroh Building, are architects and engineers.

Muskegon Piston Ring Co., Sparta, Mich., automobile engine equipment, plans one-story addition and improvements in present plant. Cost over \$45,000 with equipment. Weemhoff & Steketee, Grand Rapids, Mich., are architects.

Bundy Tubing Co., 10951 Hern Avenue, Detroit, metallic tubing and allied products, has plans for new one-story plant on Hoover Road, Macomb County, near Detroit, where tract of land recently was acquired. Power house and auxiliary one-story structures will be built. Cost close to \$100,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, are architects and engineers.

◀ MIDDLE WEST ▶

G-M Laboratories, Inc., 1731 West Belmont Avenue, Chicago, precision instruments and parts, electrical apparatus, etc., has asked bids on general contract for one-story addition. Cost close to \$45,000 with equipment. Battey & Childs, 231 South LaSalle Street, are architects.

Aurora Pump Co., 629 Loucks Street, Aurora, Ill., pumping machinery and parts, will take bids soon on general contract for one-story addition, 60 x 120 ft. Cost close to \$40,000 with equipment. Herbert Spieler, 211 Calumet Avenue, is architect.

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until April 15 for one 20-in. vertical spindle boring machine (Circular 829), cap screws (Circular 826), lead-encased cable (Circular 834).

City Council, Forsyth, Mont., will take bids soon for new municipal power plant, including three diesel engine-generator units, 300, 200 and 150-hp. rating, and auxiliary equipment. F. F. Palmer is city engineer.

United States Engineer Office, Commerce Building, St. Paul, Minn., has plans for one-story machine shop and mill shop unit at Fountain City, Wis., boatyard property.

Tobin Packing Co., Fort Dodge, Iowa, meat packer, has let general contract to C. E. Larson, Fort Dodge, for two-story and basement addition, 45 x 70 ft. Cost about \$40,000 with equipment. Smith, Brubaker & Egan, 30 North LaSalle Street, Chicago, are architects and engineers.

Commonwealth Edison Co., 72 West Adams Street, Chicago, plans gross expenditure of about \$100,000,000 for expansion and improvements in power plants and system during next 36 months, of which approximately \$42,000,000 will be used in 1940. Company has begun expansion and modernization in Powerton and Northwest steam-electric generating stations, and plans similar development at Fisk station, with installation of steam turbine-generating units, high-pressure boilers and auxiliary equipment. Extensions will be made in transmission and distributing lines.

United States Engineer Office, Post Office Building, Chicago, asks bids until April 26 for one air compressor (Circular 118).

◀ PACIFIC COAST ▶

Lockheed Aircraft Corp., Burbank, Cal., has let general contract to F. B. Aldous & Son,

8327 Wilshire Boulevard, Beverly Hills, Cal., for assembly building No. 7, one-story, 150 x 250 ft. Cost about \$130,000 with equipment. John and Donald B. Parkinson, Title Insurance Building, Los Angeles, are architects.

Shell Oil Co., Seattle, plans extensions and improvements in bulk oil plant on Harbor Island, including new buildings, steel tank storage units, pumping machinery and other facilities. Cost over \$300,000.

Administrator, Bonneville Project, Department of Interior, 811 N. E. Oregon Street, Portland, asks bids until April 19 for one deep-well turbine pumping unit, with pressure tank and fittings (Circular 932), pole line and guy hardware for St. Jones-Astoria, Ore., and Yakima-Ellensburg, Wash., transmission lines (Circular 930).

Firestone Tire & Rubber Co., Graham, Los Angeles, has let general contract to Consolidated Steel Corp., 6700 South Eastern Avenue, for one-story addition. Cost over \$40,000 with equipment.

Crown Willamette Paper Co., Camas, Wash., kraft, tissue and other paper stocks, has low bid from L. H. Hoffman, 715 S. W. Columbia Street, Portland, for four-story addition, 42 x 175 ft., for storage and distribution. Cost over \$100,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 19 for one motor-driven combination contour metal-sawing, filing and polishing machine, floor-type, with standard equipment and accessories (Schedule 1214), 240 seamless steel cylinders (Schedule 1246), motor-driven turret lathe, ram type (Schedule 1181), surface grinding abrasive machine (Schedule 1183), motor-driven, high-speed, automatic, single-spindle screw machine (Schedule 1179) for San Diego Naval Air Station.

◀ CANADA ▶

Cub Aircraft, Ltd., Adam Street, Hamilton, Ont., airplanes and parts, will take bids soon on general contract for one-story addition, 100 x 120 ft. Cost over \$100,000 with equipment. Prack & Prack, 36 James Street South, are architects.

Robin Hood Mills, 300 St. Sacrament Street, Montreal, has awarded following contracts in connection with \$1,000,000 flour mill and grain elevator at Humberstone, Ont.: General contract, Carter-Halls-Aldinger Co., Ltd., 419 Cherry Street, Toronto; steel, Dominion Bridge Co., Ltd., 1139 Shaw Street, Toronto; transmission machinery for marine tower, United Steel Sales, Ltd., 59 Pelham Avenue, Toronto; transmission machinery for elevator, Plessisville Foundry, Ltd., Plessisville, Que.

Anaconda American Brass, Ltd., Eighth Avenue, New Toronto, Ont., has awarded contract to Carter-Halls-Aldinger Co., Ltd., 419 Cherry Street, Toronto, for plant addition to cost \$50,000.

Dunlop Tire & Rubber Goods Co., Ltd., Queen Street and Booth Avenue, Toronto, has awarded contract to Foundation Co. of Ontario, Ltd., 1158 Bay Street, for \$100,000 plant addition. J. S. Rankin is engineer.

Canada Malting Co., Ltd., Queen's Quay, Toronto, has awarded contract to Atlas Construction Co., Ltd., 679 Belmont Street, Montreal, for addition to elevator to cost \$500,000. T. Pringle & Son, 36 Toronto Street, Toronto, are engineers.

Massey-Harris Co., Ltd., 915 King Street West, Toronto, has awarded contract to A. W. Robertson, Ltd., 57 Bloor Street West, Toronto, and other contracts in connection with \$75,000 addition to plant at Weston, Ont. Osborne H. Shenstone is engineer.

Longueuil, Que., has plans by Adrien Plamondon, 369 Mount Royal Avenue, Montreal, for \$200,000 waterworks addition for which tenders will be called soon.

International Braid Co. of Canada, Ltd., 999 Aqueeduct Street, Montreal, has awarded contract to A. F. Byers & Co., Ltd., 1226 University Avenue, Montreal, for plant addition at Ste. Rose, Que., to cost \$65,000, for manufacture of woven glass, etc.

Public Works Department, Ottawa, has awarded contract to Angus Robertson Co., Montreal, for \$425,000 improvements to naval drydock at Halifax, N. S., and extension to wharf No. 3. Cost \$425,000.